AFCCC/UH-96/001

# DATSAV2 UPPER-AIR DATABASE USER'S HANDBOOK

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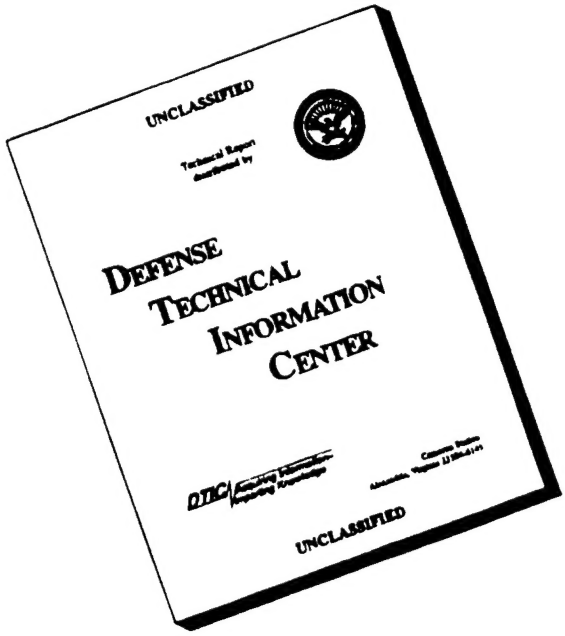


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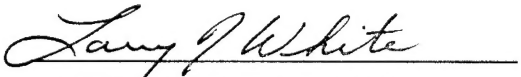

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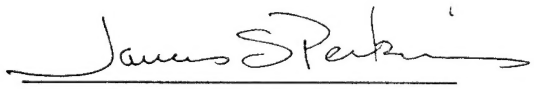

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# PREFACE

AFCCC/UH—96/001 provides users of the DATSAV2 Upper-Air Database a description of the database, specific information on the database format, and an overview of the processing and quality control used in building the database. The DATSAV2 Upper-Air Database is comprised of upper-air observations collected worldwide since January 1989, and includes data from radiosonde and rawinsonde (RAOB), pilot balloon (PIBAL), rocketsonde (ROCOB), dropsonde (DROP), Significant Level Abbreviated Messages (SLAM), and Geostationary Operational Environmental Satellite (GOES) wind observations.

## CONTENTS

# Chapter 1

# INTRODUCTION

**1.1 Purpose.** The purpose of the DATSAV2 Upper-Air Database User's Guide is to provide the user with a general description of the DATSAV2 Upper-Air Database, to list specific information concerning the format used to store data in the DATSAV2 Upper-Air Database, and to give a brief description of the processing and quality control used in building the DATSAV2 Upper-Air Database.

**1.2 Background.** The DATSAV2 Upper-Air Database is the climatological database for all worldwide upper-air observations collected since January 1989 via the Automated Weather Network (AWN), the Global Telecommunications System (GTS), and other sources. These observations are decoded and validated at the Air Force Global Weather Central (AFGWC), Offutt AFB, Neb., and processed into the climatic database by the Operating Location A (OL-A), Air Force Combat Climatology Center, Asheville, N.C. The database is used for climatological applications by AFCCC (Scott AFB, Ill.) and OL-A, as well as other Department of Defense (DoD) and civilian customers.

DATSAV2 refers to the digital tape format in which validated upper-air weather observations are stored at OL-A. From January 1973 until the inception of DATSAV2, data is stored in a different format called DATSAV (see USAFETAC/TN—77-2). The DATSAV format will be converted to DATSAV2 in the future.

The DATSAV2 format offers two major improvements when compared to the original DATSAV format:

- DATSAV2 format conforms to Federal Information Processing Standards (FIPS).
- Expanded DATSAV2 format accommodates additional quality control flags and non-decoded data that were unavailable in DATSAV.

The DATSAV2 Database contains RAOB, PIBAL, ROCOB, DROP, SLAM, and GOES wind observational data. To fully describe the method of data collection for all of these observations would require a lengthy discussion of both the GTS, operated by the World Meteorological Organization (WMO), and the AWN, which is operated by the DoD. For our purposes, GTS data is collected worldwide and sent via the National Weather Service (NWS) to Det 7, AFGWC located at Tinker AFB, Okla. Data disseminated by various countries over Radio Teletype Transmission (RATT) and Continuous Wave (CW) broadcasts is collected by various overseas AWN sites and also sent to Det. 7, AFGWC. This data, along with any other data collected by Det. 7, AFGWC is then transmitted to AFGWC where it is used for operational requirements.

Each specific type of observation is decoded at AFGWC, processed through the upper-air validator to check for meteorological soundness, and then forwarded to OL-A on a near-real-time basis via a communications link. All daily receipt data is merged into station-date-time order and block-station numbers are validated against the Master Station Catalog (MSC). The daily sorted tapes are eventually sorted further into monthly and yearly files. OL-A, AFCCC also applies several quality control procedures to the data before final archiving and forwarding to AFCCC for DoD climatic applications.

**1.3 Questions and Comments.** Address questions or comments on the DATSAV2 Upper-Air Database to OL-A, 151 Patton Ave Rm 120, Federal Building, Asheville, N.C. 28801 (DSN 266-3100, Commercial 704/271-4256).

# Chapter 2

## DESCRIPTION OF DATSAV2 UPPER-AIR DATABASE

**2.1 Database Construction** Data records are written to magnetic tape adhering to ANSI Standard X3.27-1978. A Record Control Word (RCW) (consisting of four characters) precedes each record. The length of the logical record plus the length of the RCW is expressed as a decimal numeral in the RCW. For further description, the user should consult ANSI STD X3.27-1978.

The DATSAV2 Upper-Air Database consists of blocked, variable-length records in 8-bit ASCII character format. The maximum length of a data record is 9,992 bytes and the maximum block length is 9,996 bytes. The data is recorded on cartridge tape. Sequence of the data is BLOCK STATION - YEAR - MONTH - DAY - HOUR - MINUTE - LATITUDE - LONGITUDE - TYPE REPORT - OBSERVATION TYPE.

**2.2 Database Format Introduction.** Data for each observation consists of up to four sections: control, mandatory, additional, and remarks. Data for all observations have control and mandatory sections, while only some observations have additional and remarks sections. The format is flexible in design with reserved fields in both the control and mandatory sections. This will allow for the inclusion of additional data in the future, without having to change the record or block length. The remarks section varies in length so that all available data can be included. The following general comments apply to the DATSAV2 Upper-Air format:

A. Each field is 8-bit ASCII character format.

B. Reserved fields are designated by "RES" and are coded as ASCII character "9s."

C. Analysts must avoid trying to obtain more accuracy from the data than was originally observed. They must be familiar with the original reporting units of the elements being used.

**2.3 Database Formats.** The actual database formats are listed in Sections 4 and 5. Section 4 contains the control fields used at the beginning of each data set. Section 5 contains the data section formats for all the different reports (RAOB, PIBAL, ROCOB, etc ...).

# Chapter 3

## OL-A, AFCCC DATA PROCESSING AND QUALITY CONTROL

**3.1 Processing.** Processing of the DATSAV2 Upper-Air Database at OL-A, AFCCC consists of the following:

A. Checking the readability and performing an inventory of the incoming data.

B. Processing the data through quality control programs.

C. Processing the data through a series of merge programs to produce a monthly file and then a yearly file.

The current month's data is maintained until all days for the month have been received. Then the data's merged into a monthly file. The current year's data is maintained on a series of monthly tapes until all months of the year have been received and then the data's merged into a yearly file.

**3.2 Quality Control.** All incoming upper-air data received at AFGWC is processed through the upper-air validator. The validator checks the data for "impossible" meteorological values, and performs hydrostatic, lapse rate and wind shear checks to assure the meteorological quality and soundness of the data. "Flags" within the level data section indicate exactly which element values (pressure, height, temperature, wind direction, wind speed, dew point, or density) were flagged as suspect or failed by the validation process.

# Chapter 4

## CONTROL FORMATS

### 4.1 Control Section for all Data.

| FIELD NO. | C01 | C02 | C03 | C04 | C05 | C06 | C07 | C08 | C09 | C10 | C11 | C12 | C13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | TOT WORD CNT | LVL WORD CNT | ADD WRD CNT | REM WRD CNT | RES | STNUM | YEAR | MO | DA | HR | MN | LAT | LONG |
| # CHARS | XXXX | XXXX | XX | XXX | XXX | XXXXXX | XXXX | XX | XX | XX | XX | SXXXX | SXXXXX |
| CHAR LOC | 1-4 | 5-8 | 9- | 11- | 14- | 17-22 | 23- | 27- | 29- | 31- | 33- | 35-39 | 40-45 |

| FIELD NO. | C14 | C15 | C16 | C17 | C18 | C19 | C20 | C21 | C22 | C23 | C24 | C25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | TYP REP | OB TYP | OPT | RES | ELEV | GWC REG | MARS SQR | ULA | ULO | RAOB CALL LTRS | RAOB INST TYPE | PIBAL EQUIP TYPE |
| # CHARS | X | X | X | XX | SXXXX | XX | XXX | XX | XX | XXXX | XX | X |
| CHAR LOC | 46 | 47 | 48 | 49- | 51-55 | 56- | 58-60 | 61- | 63- | 65- | 69- | 71 |

| FIELD NO. | C26 | C27 | C28 | C29 | C30 | C31 | C32 | C33 | C34 | C35 | C36 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | TEMP WIND UNITS | REL LAUNCH TIME | HGT & DENS FLAG | OLA QC | OB QC IND | NUM DAT LVL | NUM ADD GRP | NUM REM GRP | RES | SRC IND | COR OBS IND |
| # CHARS | X | XXXX | X | XXXX | XXX | XXX | XX | XX | XX | X | XX |
| CHAR LOC | 72 | 73-76 | 77 | 78- | 82- | 85- | 88- | 90- | 92- | 94 | 95- |

| FIELD NO. | C37 |
|---|---|
| DATA FIELD | KIND OF REPORT BY OB TYPE- DESCRIBED BELOW |
| # CHARS | XXXXXXXXXXXXXXXX |
| CHAR LOC | 97 - 112 |

KIND OF REPORT (RAOB)

| FIELD NO. | C371 | C372 | C373 | C374 | C375 | C376 | C377 | C378 | C379 |
|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | RT1 | RT2 | RES | RT3 | SFC VAL | RES | RES | RES | RES |
| # CHARS | XX | XX | X | XX | X | XX | X | XX | XXX |
| CHAR LOC | 97- | 99- | 101 | 102- | 104 | 105- | 107 | 108- | 110- |

KIND OF REPORT (PIBAL)

| FIELD NO. | C371 | C372 | C373 | C374 | C375 | C376 | C377 | C378 | C379 |
|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | PT1 | PT2 | RES | PT3 | SFC VAL | RES | RES | RES | RES |
| # CHARS | XX | XX | X | XX | X | XX | X | XX | XXX |
| CHAR LOC | 97- | 99- | 101 | 102- | 104 | 105- | 107 | 108- | 110- |

KIND OF REPORT (ROCOB)

| FIELD NO. | C371 | C372 | C373 | C374 | C375 | C376 | C377 | C378 | C379 |
|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | NRI | TSI | TCI | TDI | RMI | WEI | WCI | WRI | RES |
| # CHARS | XX | XX | X | XX | X | XX | X | XX | XXX |
| CHAR LOC | 97- | 99- | 101 | 102- | 104 | 105- | 107 | 108- | 110- |

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| C01 | TOT WORD CNT. Total word count of record (0000-9999) |
| C02 | LVL WORD CNT. Level Data Section Word Count (0000-9999) |
| C03 | ADD WRD CNT. Additional Data Section Word Count (00-99) |
| C04 | REM WRD CNT. Remark Section Word Count (000-999) |
| C05 | RES. Reserved, coded as 999. |
| C06 | STNUM. Block-Station Number (000000-999998). Non-permanent (roving) ships are coded as '999999'; GOES reports are coded as '000000-999999'; Dropsondes are '000000'. Land reports with no WMO numbers are coded as '000000'. |
| C07 | YEAR. Year (0000-9999) |
| C08 | MO. Month of the year (01-12) |
| C09 | DA. Day of the Month (01-31) |
| C10 | HR. Hour of the Day (00-23) |
| C11 | MN. Minute of the Hour (00-59) |
| C12 | LAT. Latitude in degrees and minutes (-9000 to +9000). South latitudes are negative. Missing coded as +9999. |
| C13 | LONG. Longitude in degrees and minutes (-18000 to +18000). East longitudes are negative. Missing coded as +99999. |
| C14 | TYP REP. Type Report as follows:<br>0,2,3,5,6,8 = RESERVED<br>1 = UPPER AIR CORRECTED REPORT<br>4 = UPPER AIR NOID REPORT<br>7 = UPPER AIR<br>9 = MISSING |
| C15 | OB TYP. Observation Type as follows:<br>1 = ROCOB<br>2 = PIBAL<br>4 = RAOB<br>9 = MISSING |
| C16 | OPT. Option Code as follows:<br>0 = SATELLITE WINDS<br>1 = BLOCK-STATION REPORTS(LAND, WMO NUMBERED)<br>2 = PERMANENT SHIP REPORTS<br>3 = NO-NAME SHIP REPORTS(ROVING)<br>4 = NAME SHIP REPORTS(ROVING)<br>5 = LAND STATION; CALL LETTERS ONLY<br>6 = DROPSONDE REPORTS<br>7 = SATELLITE VTPR<br>8 = AIRCRAFT FLIGHT LEVEL REPORTS<br>9 = MISSING |

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| C17 | RES. Reserved, coded as 99 |
| C18 | ELEV. Elevation of station in whole meters (-9999 to +9998). When elevation = 0, assume +. Missing coded as +9999. |
| C19 | GWC REG. AFGWC Region Number (01-80). Missing coded as 99 (see APPENDIX A). |
| C20 | MARS SQR. Marsden Square (001-936) according to WMO Code 2590. Missing coded as 999 (see APPENDIX B). |
| C21 | ULA. Units digit of latitude (00-99) (see APPENDIX B). |
| C22 | ULO. Units digit of longitude (00-99) (see APPENDIX B). |
| C23 | CALL LTRS. WMO Station Call Letters in ASCII Characters. For GOES reports, coded as 'GOES'; for Dropsondes, coded the aircraft tail number is last 3 digits. Missing coded as 4 ASCII blanks, '  '. |
| C24 | RAOB INST TYPE. AFGWC RAOB Instrument type (01-25) as based on the Air Weather Service Master Station Catalog (see APPENDIX C). Missing coded as 99. |
| C25 | PIBAL EQUIP TYPE. PIBAL Wind Equipment Type (0-8) according to WMO Code 0265. Missing coded as 9 (see APPENDIX C). |
| C26 | TEMP/WIND UNITS. Temperature/Wind Reported Units as follows:<br>0 = Fahrenheit/Knots<br>1 = Celsius/Knots<br>2 = Celsius/Meters per second<br>9 = Missing |
| C27 | REL LAUNCH TIME. Release or Launch Time for RAOB/PIBALs. Firing time for ROCOBs (0000-2359) in HHMM format. Missing coded as 9999. |
| C28 | Hgt & Dens FLAG. Height and Density flags (0-3,9) (Used internally by AFGWC)<br>0 = Neither flag set<br>1 = Density flag set<br>2 = Height flag set<br>3 = Density & Height flags set<br>9 = Missing |
| C29 | OLA QC. For OL-A quality control purposes (0000-9999) |

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| C30 | OB QC IND. Observation Quality Indicator (000-100) as follows:<br>100 = Passed all checks<br>0 = Failed every check<br>-99 = Quality Indicator missing<br>OQI = (((Sum of actual failures)* (Fail weight))+(Sum of actual suspects))*100/Sum of all reported values*Failed weight.(Computed by AFGWC) |
| C31 | NUM DATA LVL. Number data levels (001-999). |
| C32 | NUM ADD GRP. Number of Additional Data Groups (00-99). |
| C33 | NUM REM GRP. Number of Remarks Groups (00-99). |
| C34 | RES. Reserved, coded as 99. |
| C35 | SRC IND. A Source Indicator to stipulate original source of data (0-7,9):<br>0 = DATSAV Upper Air<br>1 = WDC-A Rocketsonde<br>2 = OL-A's TDF52<br>3 = OL-A's TDF53<br>4 = OL-A's TDF54<br>5 = OL-A's TDF56<br>6 = OL-A's TDF57<br>7 = NCDC's TDF63<br>8 = Not Used<br>9 = Missing |
| C36 | COR OBS IND. An Indicator to identify corrected observations (01-17,99). This indicator can be used in conjunction with C15 to show what part of an observation was corrected. |

| FIELD VALUE | TYPE OF CORRECTION |
|---|---|
| 01 | A |
| 02 | B |
| 03 | C |
| 04 | D |
| 05 | AB |
| 06 | AC |
| 07 | AD |
| 08 | BC |
| 09 | BD |
| 10 | CD |
| 11 | ABC |
| 12 | ABD |
| 13 | ACD |
| 14 | BCD |
| 15 | ABCD |
| 16 | SLAM |
| 17 | ROCOB |
| 99 | MISSING |

## 4.2 Control Section for RAOB Report.

**FIELD C37 - KIND OF REPORT (RAOB)**

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| C371 | RT1. DATA SOURCE FLAG1<br>00 = NONE OF THIS SET<br>01 = RAOB PART C<br>02 = RAOB PART B<br>03 = RAOB PARTS B & C<br>04 = RAOB PART A<br>05 = RAOB PARTS A & C<br>06 = RAOB PARTS A & B<br>07 = RAOB PARTS A, B & C<br>99 = MISSING |
| C372 | RT2. DATA SOURCE FLAG2<br>00 = NONE OF THIS SET<br>01 = DROPSONDE PART B<br>02 = DROPSONDE PART A<br>03 = DROPSONDE PARTS A & B<br>04 = RAOB PART D<br>05 = RAOB PART D AND DROPSONDE PART B<br>06 = RAOB PART D AND DROPSONDE PART A<br>07 = RAOB PART D AND DROPSONDE PARTS A & B<br>99 = MISSING |
| C373 | RES. Reserved, coded as 9. |
| C374 | RT3. DATA SOURCE FLAG3<br>00 = NONE OF THIS SET<br>01 = RESERVED<br>02 = SATELLITE (GOES, ATS, ETC.,)<br>03 = RESERVED<br>04 = SLAM<br>05 = RESERVED<br>06 = SLAM & SATELLITE VTPR<br>07 = RESERVED<br>99 = MISSING |
| C375 | SFC VAL. Surface level validity. Following indicates the validity of the surface level data:<br>0 = Surface data passed validation<br>1 = Surface Pressure and/or Temperature invalidated, but remainder of sounding is hydrostatically consistent.<br>4 = Surface Pressure invalidated only.<br>9 = missing |
| C376 | RES. Reserved, coded as 99. |
| C377 | RES. Reserved, coded as 9. |
| C378 | RES. Reserved, coded as 99. |
| C379 | RES. Reserved, coded as 999. |

## 4.3 Control Section for PIBAL Report.

FIELD C37 - KIND OF REPORT (PIBAL)

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| C371 | PT1. DATA SOURCE FLAG1<br>00 = NONE OF THIS SET<br>01 = PIBAL PART C<br>02 = PIBAL PART B<br>03 = PIBAL PARTS B & C<br>04 = PIBAL PART A<br>05 = PIBAL PARTS A & C<br>06 = PIBAL PARTS A & B<br>07 = PIBAL PARTS A, B & C<br>99 = MISSING |
| C372 | PT2. DATA SOURCE FLAG2<br>00 = NONE OF THIS SET<br>01 = DROPSONDE WINDS PART B<br>02 = DROPSONDE WINDS PART A<br>03 = DROPSONDE WINDS PARTS A & B<br>04 = PIBAL PART D<br>05 = PIBAL PART D AND DROP WINDS PART B<br>06 = PIBAL PART D AND DROP WINDS PART A<br>07 = PIBAL PART D AND DROP WINDS PARTS A & B<br>99 = MISSING |
| C373 | RES. Reserved, coded as 9. |
| C374 | PT3. DATA SOURCE FLAG3<br>00 = NONE OF THIS SET<br>01 = RESERVED<br>02 = SATELLITE (GOES, ATS, ETC.,)<br>03 = RESERVED<br>04 = SLAM<br>05 = RESERVED<br>06 = SLAM & SATELLITE VTPR<br>07 = RESERVED<br>99 = MISSING |
| C375 | SFC VAL. Surface level validity. Following indicates the validity of the surface level data:<br>0 = Surface data passed validation<br>1 = Surface Pressure and/or Temperature invalidated, but remainder of sounding is hydrostatically consistent.<br>4 = Surface Pressure invalidated only.<br>9 = missing |
| C376 | RES. Reserved, coded as 99. |
| C377 | RES. Reserved, coded as 9. |
| C378 | RES. Reserved, coded as 99. |
| C379 | RES. Reserved, coded as 999. |

## 4.4 Control Section for ROCOB Report.

**FIELD C37 - KIND OF REPORT (ROCOB)**

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| C371 | NRI. No report indicator (00-09) according to WMO Code 0262. Missing coded as 99 (see APPENDIX C). |
| C372 | TSI. Thermodynamic Sensing Equipment (00-79) according to WMO Code 1085. Missing coded as 99 (see APPENDIX C). |
| C373 | TCI. Thermodynamic Correction (0-3) according to WMO Code 0659. Missing coded as 9 (see APPENDIX C). |
| C374 | TDI. Thermodynamic Data Reducing (01-02,09) according to WMO Code 2649. Missing coded as 99 (see APPENDIX C). |
| C375 | RMI. Rocket Motor Indicator (0-5) according to WMO Code 3644. Missing coded as 9 (see APPENDIX C). |
| C376 | WEI. Wind Equipment Indicator (00-79) according to WMO Code 1095. Missing coded as 99 (see APPENDIX C). |
| C377 | WCI. Wind Correction Technique (0-3) according to WMO Code 0659. Missing coded as 9 (see APPENDIX C). |
| C378 | WRI. Wind Reduction Method (01-02,09) according to WMO Code 2649. Missing coded as 99 (see APPENDIX C). |
| C379 | RES. Reserved, coded as 999. |

# Chapter 5

## DATA FORMATS

### 5.1 RAOB Report Level Data Section.

| FIELD NO. | L01 | L02 | L03 | L04 | L05 | L06 | L07 | L08 | L09 | L10 | L11 | L12 | L12A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | DTI | RES | PRESS | HEIGHT | RES | TEMP | DEW PT TEMP | RES | RES | RES | RES | RES | DPT FLG |
| # CHARS | X | X | XXXXX | SXXXXX | X | XXXX | XXXX | XXX | XXXX | X | XXX | XX | X |
| CHAR LOC | 1 | 2 | 3-7 | 8-13 | 14 | 15- | 19-22 | 23- | 26- | 30 | 31- | 34- | 36 |

| FIELD NO. | L13 | | L14 | | L15 | | L16 | L17 | L18 |
|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | PFF | PSF | HFF | HSF | TFF | TSF | RES | RES | RES |
| # CHARS | XX | XX | XX | XX | XX | XX | XXXX | XXXX | XXXX |
| CHAR LOC | 37- | 39- | 41- | 43- | 45- | 47- | 49- | 53- | 57- |

**Fields L01 through L18 are repeated for each level, up to a maximum of 160 levels.**

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| L01 | DTI. Data Type Indicator as follows:<br>A = Surface Data<br>B = Mandatory Level Data<br>C = Significant Level Data<br>G = Manual Report Level Data |

Note: See Appendix D for descriptions of Data Type Indicators.

| | |
|---|---|
| L02 | RES. Reserved, coded as 9. |
| L03 | PRESS. Pressure level (00000-99998) stored in tenths of millibars (e.g. 850.0 stored as 08500). Coded as 99999 when field is not reported. |
| L04 | HEIGHT. Height (-99999 to +99998) of pressure level in whole meters. When height = 0, assume + and coded as +99999 when field is not reported. |
| L05 | RES. Reserved, coded as 9. |
| L06 | TEMP. Temperature (0000-9998) at pressure level stored in tenths of degrees Kelvin (e.g. 254.2 stored as 2542). Coded as 9999 when field is not reported. |
| L07 | DEW PT TEMP. Dew Point Temperature (0000-9998) at pressure level stored in tenths of degrees Kelvin (e.g. 254.2 stored as 2542). Coded as 9999 when field is not reported. |
| L08 | RES. Reserved, coded as 999. |

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| L09 | RES. Reserved, coded as 9999. |
| L10 | RES. Reserved, coded as 9. |
| L11 | RES. Reserved, coded as 999. |
| L12 | RES. Reserved, coded as 99. |
| L12A | DPF. Dew Point Flag (0-2,9)<br>0 = Dew Point not Recomputed or Suspect<br>1 = Dew Point Recomputed<br>2 = Dew Point Suspect<br>9 = Missing |
| L13 | PFF. Pressure Fail Flag (00-87)<br>PSF. Pressure Suspect Flag (00-77) |
| L14 | HFF. Height Fail Flag (00-87)<br>HSF. Height Suspect Flag (00-77) |
| L15 | TFF. Temperature Fail Flag (00-87)<br>TSF. Temperature Suspect Flag (00-77) |
| L16 | RES. Reserved, coded as 9999. |
| L17 | RES. Reserved, coded as 9999. |
| L18 | RES. Reserved, coded as 9999. |

Note: See Appendix E for a description of Fail & Suspect Flags.
Missing = 9999

## 5.2 RAOB Report Additional Data Section.

TROPOPAUSE LEVEL DATA

| FIELD NO. | AD00 | AD01 | AD02 | AD03 | AD04 | AD05 | AD06 | AD07 | AD08 |
|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | IND | PRESS | HEIGHT | TEMP | DEW PT TEMP | TROP FLG | WIND DIR | WIND SPEED | RESERVED |
| # CHARS | D | XXXXX | XXXXXX | XXXX | XXXX | X | XXX | XXXX | XXXXXXXX |
| CHAR LOC | 1 | 2-6 | 7-12 | 13- | 17- | 21 | 22- | 25- | 29-36 |

CLOUD DATA AND PRECIPITABLE WATER/PRESENT WEATHER

| FIELD NO. | AF00 | AF01 | AF02 | AF03 | AF04 | AF05 | AF06 | AT00 | AT01 | AT02 | AT03 | AT04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | IND | TCC | LCT | CH | MCT | HCT | RES | IND | SAT MOIST RATIO | PRECIP WATER | PRES WX | RES |
| # CHARS | F | XX | XX | XX | XX | XX | X | T | XXX | XXXX | XXXX | XXX XX |
| CHAR LOC | 1 | 2-3 | 4-5 | 6-7 | 8-9 | 10- | 12 | 13 | 14- | 17-20 | 21- | 25-36 |

STABILITY INDICES AND FREEZING LEVELS

| FIELD NO. | AK00 | AK01 | AK02 | AK03 | AK04 | AM00 | AM01 | AM02 | AM03 | AM04 | AM05 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | IND | SWEAT INDEX | FLG | SHOW-ALTER INDEX | RES | IND | RES | FRZG HT LVL 1 | FRZG HT LVL 2 | FRZG HT LVL 3 | RESERVED |
| # CHARS | K | XXX | X | XX | X | M | XXX | SXXXX | SXXXX | SXXXX | XXXXXXXXX |
| CHAR LOC | 1 | 2-4 | 5 | 6-7 | 8 | 9 | 10- | 13-17 | 18-22 | 23-27 | 28-36 |

THERMAL WINDS --- LEVELS 1, 2 & 3

| FIELD NO. | AP00 | AP01 | AP02 | AP03 | AP04 | AP05 | AP06 | AP07 | AP08 | AP09 | AP10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LAYER 1 | | | LAYER 2 | | | LAYER 3 | | | |
| DATA FIELD | IND | THICKNESS | WIND DIR | WIND SPD | THICKNESS | WIND DIR | WIND SPD | THICKNESS | WIND DIR | WIND SPD | RES |
| # CHARS | P | XXX | XXX | XXXX | XXX | XXX | XXXX | XXX | XXX | XXXX | XXXXX |
| CHAR LOC | 1 | 2-4 | 5-7 | 8-11 | 12-14 | 15- | 18- | 22-24 | 25- | 28- | 32-36 |

## DATA GROUP D — TROPOPAUSE LAYER DATA

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| AD00 | IND. Value = D (GROUP MAY BE REPEATED UP TO A MAXIMUM OF 4 TIMES) |
| AD01 | PRESS. Tropopause Pressure (00000-99998) stored in tenths of millibars (e.g. 10.3 mb stored as 00103). Missing coded as 99999. |
| AD02 | HEIGHT. Tropopause Height (+00000 to +99998) stored in whole meters. Missing coded as +99999. |
| AD03 | TEMP. Tropopause Temperature (0000-9998) stored in tenths of degrees Kelvin (e.g. 245.6 stored as 2456). Missing coded as 9999. |
| AD04 | DEW PT TEMP. Tropopause Dew Point Temperature (0000-9998) stored in tenths of degrees Kelvin (e.g. 265.3 stored as 2653). Missing coded as 9999. |
| AD05 | FLG. Tropopause Flag as follows:<br>0 = Reported<br>1 = Computed<br>8 = Invalidated<br>9 = Missing |
| AD06 | WIND DIR. Tropopause level wind direction (001-360) in whole degrees. Calm = 000. Variable coded as 990 and missing coded as 999. |
| AD07 | WIND SPEED. Tropopause level wind speed (0000-9998) stored in tenths of meters per second (e.g. 35.5 stored as 0355). Missing coded as 9999. |
| AD08 | RESERVED. Coded as 99999999 |

## DATA GROUP F — CLOUD DATA

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| AF00 | IND. Value = F (cloud data) |
| AF01 | TCC. Total Cloud Coverage (00-10) according to WMO Code 2700. Missing coded as 99 (see APPENDIX C). |
| AF02 | LCT. Low Cloud Type (00-10) according to WMO Code 0513. Missing coded as 99 (see APPENDIX C). |
| AF03 | CH. Cloud Height (00-10) according to WMO Code 1600. Missing coded as 99 (see APPENDIX C). |
| AF04 | MCT. Middle Cloud Type (00-10) according to WMO Code 0515. Missing coded as 99 (see APPENDIX C). |
| AF05 | HCT. High Cloud Type (00-10) according to WMO Code 0509. Missing coded as 99 (see APPENDIX C). |
| AF06 | RES. Reserved, coded as 9. |

## DATA GROUP T — PRECIPITABLE WATER/PRESENT WEATHER

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| AT00 | IND. Value = T (precipitable water) |
| AT01 | SAT MOIST RATIO. Saturation Moisture Ratio in whole percent (000-100). Missing coded as 999. |
| AT02 | PRECIP WATER. Precipitable Water Amount (0000-9998) stored in hundredths of an inch (e.g. 1.06 stored as 0106). Missing coded as 9999. |
| AT03 | PRES WX 1 Present Weather codes ww1 (000-099). Missing coded 95999, according to WMO Code 4677 (see APPENDIX C). |
| AT04 | Present Weather code ww2 (000-099). Missing coded as 999, according to WMO Code 4677 (see APPENDIX C). |
| AT05 | Res. Reserved. Coded as 9999999999. |

## DATA GROUP K — STABILITY INDEXES

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| AK00 | IND. Value = K (Stability Indices) |
| AK01 | SWEAT INDEX. (000-998). Missing coded as 999. |
| AK02 | FLG. Showalter Flag as follows:<br>0 = Reported<br>1 = Computed<br>9 = Missing |
| AK03 | SHOW INDEX. Showalter Stability Index (00-99) Possible values are as follows:<br>0 = +0 or -0<br>1 thru 40 = +1 thru +40<br>41 thru 50 = not used<br>51 thru 90 = -1 thru -40<br>91 thru 98 = not used<br>99 = Missing |
| AK04 | RES. Reserved, coded as 9. |

## DATA GROUP M -- FREEZING LEVELS

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| AM00 | IND. Value = M (Freezing Level Data -- up to 3 levels) |
| AM01 | RES. Reserved, coded as 999. |
| AM02 | FRZG HT LVL1. Freezing Level 1 Height below 500mb (-9999 to +9998) in whole meters. Missing coded as +9999. |
| AM03 | FRZG HT LVL2. Freezing Level 2 Height below 500mb (-9999 to +9998) in whole meters. Missing coded as +9999. |
| AM04 | FRZG HT LVL3. Freezing Level 3 Height below 500mb (-9999 to +9998) in whole meters. Missing coded as +9999. |
| AM05 | RESERVED. Coded as 999999999. |

## DATA GROUP P — THERMAL WINDS — LEVELS 1, 2 & 3

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| AP00 | IND. Value = P |
| AP01 | LAYER 1 THICKNESS. Thickness (000-998) in decameters of the 1000 - 700 mb layer. Missing coded as 999. |
| AP02 | LAYER 1 WIND DIR. Thermal wind direction (001-360) in whole degrees, true, of the 1000 - 700 mb layer. Calm = 000, Variable = 990 and Missing coded as 999. |
| AP03 | LAYER 1 WIND SPD. Thermal wind speed (0000-9998) in tenths of meters per second (e.g. 25.4 stored as 0254) of the 1000-700 mb layer. Missing coded as 9999. |
| AP04 | LAYER 2 THICKNESS. Thickness (000-998) in decameters of the 1000 - 500 mb layer. Missing coded as 999. |
| AP05 | LAYER 2 WIND DIR. Thermal wind direction (001-360) in whole degrees, true, of the 1000 - 500 mb layer. Calm = 000, Variable = 990 and Missing coded as 999. |
| AP06 | LAYER 2 WIND SPD. Thermal wind speed (0000-9998) in tenths of meters per second (e.g. 25.4 stored as 0254) of the 1000-500 mb layer. Missing coded as 9999. |
| AP07 | LAYER 3 THICKNESS. Thickness (000-998) in decameters of the 500 - 300 mb layer. Missing coded as 999. |
| AP08 | LAYER 3 WIND DIR. Thermal wind direction (001-360) in whole degrees, true, of the 500 - 300 mb layer. Calm = 000, Variable = 990 and Missing coded as 999. |
| AP09 | LAYER 3 WIND SPD. Thermal wind speed (0000-9998) in tenths of meters per second (e.g. 25.4 stored as 0254) of the 500 - 300 mb layer. Missing coded as 9999. |
| AP10 | RES. Reserved, coded as 99999. |

## 5.3 RAOB Report Remarks Data Section.

| FIELD NO. | N00 | N01 | N02 | N03 | N04 |
|---|---|---|---|---|---|
| | | DATA | | | |
| DATA | | SOURCE | | REM | REMARKS |
| FIELD | IND | IND | = | LENG | DATA |
| # CHARS | W | XX | X | XXXX | |
| CHAR LOC | 1 | 2-3 | 4 | 5-8 | 9 - N |

**Remarks Data Section can be as long as necessary to include all 101 groups and non-decoded data. With multiple data source indicators, fields N00 - N04 can be repeated as many times as necessary.**

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| N00 | IND. Value = "W" |
| N01 | DATA SOURCE IND. Data Source Indicator as follows:<br>RA = RAOB Part A - Remarks Data<br>RB = RAOB Part B - Remarks Data<br>RC = RAOB Part C - Remarks Data<br>RD = RAOB Part D - Remarks Data<br>SL = SLAM - Remarks Data<br>DA = Dropsonde Part A - Remarks Data<br>DB = Dropsonde Part B - Remarks Data<br>UU = Unknown |
| N02 | = (Special Indicator) |
| N03 | REM LENG. Length in words (0000-9999) of the remarks data for the source specified in N01. |
| N04 | REMARKS DATA. Data in ASCII Characters |

## 5.4 PIBAL Report Level Data Section.

| FIELD NO. | L01 | L02 | L03 | L04 | L05 | L06 | L07 | L08 | L09 | L10 | L11 | L12 | L12A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | DTI | RES | PRESS | HEIGHT | FLG | RES | RES | WIND DIR | WIND SPD | RES | RES | RES | RES |
| # CHARS | X | X | XXXXX | SXXXXX | X | XXXX | XXXX | XXX | XXXX | X | XXX | XX | X |
| CHAR LOC | 1 | 2 | 3-7 | 8-13 | 14 | 15- | 19-22 | 23- | 26- | 30 | 31- | 34- | 36 |

| FIELD NO. | L13 | L14 | L15 | L16 | | L17 | | L18 |
|---|---|---|---|---|---|---|---|---|
| DATA FIELD | RES | RES | RES | DFF | DSF | SFF | SSF | RES |
| # CHARS | XXXX | XXXX | XXXX | XX | XX | XX | XX | XXXX |
| CHAR LOC | 37- | 41- | 45- | 49- | 51- | 53- | 55- | 57- |

**Fields L01 through L18 are repeated for each level, up to a maximum of 160 levels.**

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| L01 | DTI. Data Type Indicator as follows:<br>A = Surface Data<br>B = Mandatory Level Data<br>C = Significant Level Data |
| L02 | RES. Reserved, coded as 9. |
| L03 | PRESS. Pressure level (00000-99998) stored in tenths of millibars (e.g. 850.0 stored as 08500). Coded as 99999 when field is not reported. |
| L04 | HEIGHT. Height (-99999 to +99998) of pressure level in whole meters. When height = 0, assume + and coded as +99999 when field is not reported. |
| L05 | FLG. Height Flag as follows:<br>0 = No flag set<br>1 = Height value has been recomputed due to missing or garbled reports, or computed for special levels<br>2 = Standard Atmosphere height values assigned in place of reported pressure<br>3 = Both 1 and 2 apply<br>4 = Surface Validated<br>9 = Missing |
| L06 | RES. Reserved, coded as 9999. |
| L07 | RES. Reserved, coded as 9999. |
| L08 | WIND DIR. Wind Direction (001-360) at pressure level stored in whole degrees. Variable wind direction is coded as 990, calm as 000 and missing as 999. |

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| L09 | WIND SPD. Wind speed (0000-9998) stored in tenths of meters per second (e.g. 32.2 stored as 0322). Calm=0000, missing=9999. |
| L10 | RES. Reserved, coded as 9. |
| L11 | RES. Reserved, coded as 999. |
| L12 | RES. Reserved, coded as 99. |
| L12A | RES. Reserved, coded as 9. |
| L13 | RES. Reserved, coded as 9999. |
| L14 | RES. Reserved, coded as 9999. |
| L15 | RES. Reserved, coded as 9999. |
| L16 | DFF. Wind Direction Fail Flags (00-87)<br>DSF. Wind Direction Suspect Flags (00-77) |
| L17 | SFF. Wind Speed Fail Flags (00-87)<br>SSF. Wind Speed Suspect Flags (00-77) |
| L18 | RES. Reserved, coded as 9999. |

Note: (1) See APPENDIX E for a description of Suspect and Fail Flags.
Missing = 9999.

## 5.5 PIBAL Report Additional Data Section.

MAXIMUM WIND DATA

| FIELD NO | AE00 | AE01 | AE02 | AE03 | AE04 | AE05 | AE06 | AE07 | AE08 | AE09 | AE10 | AE11 | AE12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MAX | MAX | | PRESS | | | | MAX | MAX | | | |
| DATA | | WND | WND | | HGT | | | | WND | WIND | | | |
| FIELD | IND | LOC | FLG | RES | FLG | PRESS | HEIGHT | RES | DIR | SPD | VDA | VDB | RES |
| #CHARS | E | X | X | X | X | XXXXX | SXXXXX | X | XXX | XXXX | XXXX | XXXX | XXXX |
| CHAR LOC | 1 | 2 | 3 | 4 | 5 | 6-10 | 11-16 | 17 | 18- | 21- | 25- | 29- | 33- |

MEAN WIND DATA

| FIELD NO. | AH00 | AH01 | AH02 | AH03 | AH04 | AH05 | AH06 |
|---|---|---|---|---|---|---|---|
| | | LVL 1 | LVL 1 | | LVL 2 | LVL 2 | |
| DATA | | MN WND | MN WND | | MN WND | MN WND | |
| FIELD | IND | DIR | SPD | RES | DIR | SPD | RESERVED |
| # CHARS | H | XXX | XXXX | X | XXX | XXXX | XXXXXXXXXXXXXXXXXXXX |
| CHAR LOC | 1 | 2-4 | 5-8 | 9 | 10-12 | 13-16 | 17-36 |

### DATA GROUP E -- PIBAL MAXIMUM WIND DATA

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| AE00 | IND. Value = E (GROUP CAN BE REPEATED UP TO A MAXIMUM OF 4 TIMES) |
| AE01 | MAX WND LOC. Maximum Wind Location as follows:<br>0 = Maximum wind is not a report terminating level.<br>1 = Maximum wind is a report terminating level.<br>9= Missing |
| AE02 | MAX WND FLG. Maximum Wind Report/Select Indicator as follows:<br>0 = Maximum Wind was reported.<br>1 = Maximum Wind was computed from reported winds.<br>9 = Missing |
| AE03 | RES. Reserved, coded as 9. |
| AE04 | PRESS/HGT FLG. Pressure/Height recompute flag as follows:<br>0 = Neither recomputed.<br>1 = Height recomputed due to missing or garbled data.<br>2 = Pressure recomputed due to missing or garbled data.<br>3 = Both recomputed.<br>9 = Missing |
| AE05 | PRESS. Pressure (00000-99998) at the maximum wind level stored in tenths of millibars (e.g. 500.3 stored as 05003). Missing coded as 99999. |
| AE06 | HEIGHT. Height (-99999 to +99998) of the maximum wind level stored in whole meters. When height = 0, assume +. Missing coded as +99999. |

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| AE07 | RES. Reserved, coded as 9. |
| AE08 | MAX WND DIR. Direction of maximum wind (001-360) in whole degrees, true. Missing coded as 999. |
| AE09 | MAX WIND SPD. Maximum Wind Speed (0000-9998) stored in tenths of meters per second (e.g. 35.4 stored as 0354). Missing coded as 9999. |
| AE10 | VDA. Absolute Value of the vector difference between the wind at the level of the maximum wind and the wind 3,000 feet abcve, (0000-9998) stored in tenths of meters per second (e.g. 35.4 stored as 0354). Missing coded as 9999. |
| AE11 | VDB. Absolute value of the vector difference between the wind at the level of the maximum wind and the wind 3,000 feet below, (0000-9998) stored in tenths of meters per second (e.g. 35.4 stored as 0354). Missing coded as 9999. |
| AE12 | RES. Reserved, coded as 9999. |

DATA GROUP H -- PIBAL MEAN WIND DATA

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| AH00 | IND. Value = H |
| AH01 | LEVEL 1 MN WND DIR. Mean Wind Direction (001-360) of the surface to 5000 foot layer in whole degrees, true. Missing coded as 999. |
| AH02 | LEVEL 1 MN WND SPD. Mean Wind Speed (0000-9998) of the surface to 5000 ft layer. Stored in tenths of meters per second (e.g. 35.4 stored as 0354). Missing coded as 9999. |
| AH03 | RES. Reserved, coded as 9. |
| AH04 | LEVEL 2 MN WND DIR. Mean Wind Direction (001-360) of the 5000 to 10000 foot layer in whole degrees, true. Missing coded as 999. |
| AH05 | LEVEL 2 MN WND SPD. Mean Wind Speed (0000-9998) of the 5000 to 10000 ft layer. Stored in tenths of meters per second (e.g. 35.4 stored as 0354). Missing coded as 9999. |
| AH06 | RESERVED. Coded as 99999999999999999999. |

## 5.6 PIBAL Report Remarks Data Section.

| FIELD NO. | N00 | N01 | N02 | N03 | N04 |
|---|---|---|---|---|---|
| | | DATA | | | |
| DATA | | SOURCE | | REM | REMARKS |
| FIELD | IND | IND | = | LNG | DATA |
| # CHARS | X | XX | X | XXXX | |
| CHAR LOC | 1 | 2-3 | 4 | 5-8 | 9 - N |

**Remarks data section can be as long as necessary to include all non-decoded data. With multiple data source indicators, fields N00 - N04 can be repeated as many times as necessary.**

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| N00 | IND. Value = "X" |
| N01 | DATA SOURCE IND. Data Source Indicator as follows:<br>PA = PIBAL Part A - Remarks Data<br>PB = PIBAL Part B - Remarks Data<br>PC = PIBAL Part C - Remarks Data<br>PD = PIBAL Part D - Remarks Data<br>ST = GOES Satellite Winds - Remarks Data<br>WA = Drop Winds Part A - Remarks Data<br>WB = Drop Winds Part B - Remarks Data<br>UU = Unknown |
| N02 | = (Special Indicator) |
| N03 | REM LENG. Length in words (0000-9999) of the remarks data for the source specified in N01. |
| N04 | REMARKS DATA. Data in ASCII Characters |

## 5.7 ROCOB Report Level Data Section.

| FIELD NO. | L01 | L02 | L03 | L04 | L05 | L06 | L07 | L08 | L09 | L10 | L11 | L12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATA FIELD | DTI | PDL | PRESS | HEIGHT | RES | TEMP | RES | WIND DIR | WIND SPD | DDL | DENS | RES |
| # CHARS | X | X | XXXXX | SXXXXX | X | XXXX | XXXX | XXX | XXXX | X | XXX | XXX |
| CHAR LOC | 1 | 2 | 3-7 | 8-13 | 14 | 15- | 19- | 23- | 26- | 30 | 31- | 34- |

| FIELD NO. | L13 | L14 | L15 | L16 | L17 | L18 |
|---|---|---|---|---|---|---|
| DATA FIELD | PFF | PSF | HFF | HSF | TFF | TSF | DFF | DSF | SFF | SSF | NFF | NSF |
| # CHARS | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX | XX |
| CHAR LOC | 37- | 39- | 41- | 43- | 45- | 47- | 49- | 51- | 53- | 55- | 57- | 59- |

Fields L01 through L18 are repeated for each level, up to a maximum of 160 levels.

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| L01 | DTI. Data Type Indicator as follows:<br>B = Mandatory Level Data<br>C = Significant Level Data |
| L02 | PDL. Pressure Decimal Location (0-5); where 0 = whole units, 1 = tenths, 2 = hundredths, etc. Missing coded as 9. |
| L03 | PRESS. Pressure level (00000-99998), where Pressure = PRESS * 10**(-PDL) in millibars. Coded as 99999 when field is not reported. |
| L04 | HEIGHT. Height (+00000 to +00999) of pressure level in hectometers (e.g. 24,900 meters coded as +00249). When height = 0, assume + and coded as +99999 when field is not reported. |
| L05 | RES. Reserved, coded as 9. |
| L06 | TEMP. Temperature (0000-9998) at pressure level stored in tenths of degrees Kelvin (e.g. 254.2 stored as 2542). Coded as 9999 when field is not reported. |
| L07 | RES. Reserved, coded as 9999. |
| L08 | WIND DIR. Wind Direction (001-360) at pressure level stored in whole degrees. Variable wind direction is coded as 990, calm as 000 and missing as 999. |
| L09 | WIND SPD. Wind speed (0000-9998) stored in tenths of meters per second (e.g. 32.2 stored as 0322). Calm=0000, missing=9999. |
| L10 | DDL. Density Decimal Location (0-8); where 0 = whole number, 1 = tenths, etc. Missing coded as 9. |

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| L11 | DENS. Density (000-998) in grams per cubic meter. Density = DENS * 10**(-DDL). Coded as 999 when field is not reported. |
| L12 | RES. Reserved, coded as 99. |
| L12A | RES. Reserved, coded as 9. |
| L13 | PFF. Pressure Fail Flag (00-87)<br>PSF. Pressure Suspect Flag (00-77) |
| L14 | HFF. Height Fail Flag (00-87)<br>HSF. Height Suspect Flag (00-77) |
| L15 | TFF. Temperature Fail Flag (00-87)<br>TSF. Temperature Suspect Flag (00-77) |
| L16 | DFF. Wind Direction Fail Flag (00-87)<br>DSF. Wind Direction Suspect Flag (00-77) |
| L17 | SFF. Wind Speed Fail Flag (00-87)<br>SSF. Wind Speed Suspect Flag (00-77) |
| L18 | NFF. Density Fail Flag (00-77)<br>NSF. Density Suspect Flag (00-77) |

Note: See APPENDIX E for a description of Suspect and Fail Flags.
Missing = 9999.

## 5.8 ROCOB Report Remarks Data Section.

| FIELD NO. | N00 | N01 | N02 | N03 | N04 |
|---|---|---|---|---|---|
| | | DATA | | | |
| DATA | | SOURCE | | REM | REMARKS |
| FIELD | IND | IND | = | LNG | DATA |
| # CHARS | Y | XX | X | XXXX | |
| CHAR LOC | 1 | 2-3 | 4 | 5-8 | 9 - N |

**Remarks data section can be as long as necessary to contain all non-decoded data.**

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| N00 | IND. Value = "Y" |
| N01 | DATA SOURCE IND. Data Source Indicator as follows:<br>RO = ROCOB Non-decoded data<br>UU = Unknown |

The following indicators apply to ROCOBs converted by OL-A, AFCCC from the World Data Center-A (WDC-A) rocketsonde format, a "1" in control field C35, (ref FMH#10, chapter 7):

RW = Special Sensor Type Code and Special Sensor Correction Method from WDC-A format, data record type = 00, columns 26-31

RY = Thermodynamic Base Data from WDC-A format, data record = 00, columns 66-78

RP = RAOB Release Point from WDC-A format, data record type = 00, columns 64-65

RI = RAOB Instrument Type from WDC-A format, data record type = 00, columns 62-63

RQ = Questionable Data from WDC-A format, data record type = 00 - 19, columns 36-61. If more than one WDC-A Questionable Data card was converted, the data format for the RQ indicator is: data in columns 36-61 of WDC-A record type = 00, followed by data in columns 36-61 of WDC-A record type = 01,....

RT = Temperature Corrections from WDC-A format, data record type = 30, columns 50-52. The data format for the RT indicator is: AAAAA is altitude data from WDCA columns 16-20, TTT is the temperature correctin. Multiple temperature correction data will be separated by ASCII blanks (e.g. AAAAA.TTT AAAAA.TTT AAAAA.TTT).

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| | RX = Special Sensor Data from WDC-A format, data record type = 30 and 40, columns 70-76. The data format for the RX indicator is: AAAAA.SSSSSSS where, AAAAA is altitude data from WDC-A columns 16-20 SSSSSSS is the special sensor data. Multiple special sensor data will be separated by ASCII blanks (e.g. AAAAA.SSSSSSS AAAAA.SSSSSSS AAAAA.SSSSSSS). |
| | RF = Rate of Fall Data from WDC-A format, data record type = 30, columns 43-45. The data format for the RX indicator is: AAAAA.RRR where AAAAA is altitude from WDC-A columns 16-20 and RRR is the rate of fall data. Multiple special sensor data will be separated by ASCII blanks (e.g. AAAAA.RRR AAAAA.RRR AAAAA.RRR). |
| | RR = Supplemental Data from WDC-A format, data record type = 70, columns 16-76. If more than one WDC-A Supplemental Data card was converted, the data format for the RR indicator is: data in columns 16-76 of the first WDC-A record type = 70, followed by data in columns 36-61 of the second WDC-A record type = 70, followed by data in columns 36-61 of the third WDC-A record type = 70, .... |
| N02 | = (Special Indicator) |
| N03 | REM LNG. Length in words (0000-9999) of the remarks data for the source specified in N01. |
| N04 | REMARKS DATA. Data in ASCII Characters |

## APPENDIX A

## AFGWC REGIONS DATA BASE

This table shows the Latitude-Longitude boundaries of the AFGWC Regions data base.

| AFGWC REGION | LATITUDES | LONGITUDES |
|---|---|---|
| 1 | 80.00 N - 90.00 N | 180.00 W - 179.99 E |
| 2 | 70.00 N - 79.99 N | 180.00 W - 179.99 E |
| 3 | 60.00 N - 69.99 N | 180.00 W - 53.00 W |
| 4 | 60.00 N - 69.99 N | 52.99 W - 19.99 E |
| 5 | 60.00 N - 69.99 N | 20.00 E - 34.99 E |
| 6 | 60.00 N - 69.99 N | 35.00 4 - 51.99 E |
| 7 | 60.00 N - 69.99 N | 52.00 E - 86.99 E |
| 8 | 60.00 N - 69.99 N | 87.00 E - 141.99 E |
| 9 | 60.00 N - 69.99 N | 142.00 E - 179.99 E |
| 10 | 60.00 N - 59.99 N | 180.00 W - 95.00 E |
| 11 | 50.00 N - 59.99 N | 94.99 W - 1.00 W |
| 12 | 50.00 N - 59.99 N | 0.00 W - 8.99 E |
| 13 | 50.00 N - 59.99 N | 9.00 E - 13.99 E |
| 14 | 50.00 N - 59.99 N | 14.00 E - 21.99 E |
| 15 | 50.00 N - 59.99 N | 22.00 E - 27.99 E |
| 16 | 50.00 N - 59.99 N | 28.00 E - 34.99 E |
| 17 | 50.00 N - 59.99 N | 35.00 E - 48.99 E |
| 18 | 50.00 N - 59.99 N | 49.00 E - 60.00 E |
| 19 | 50.00 N - 59.99 N | 61.00 E - 75.99 E |
| 20 | 50.00 N - 59.99 N | 76.00 E - 89.99 E |
| 21 | 50.00 N - 59.99 N | 90.00 E - 105.99 E |
| 22 | 50.00 N - 59.99 N | 106.00 E - 119.99 E |
| 23 | 50.00 N - 59.99 N | 120.00 E - 139.99 E |
| 24 | 50.00 N - 59.99 N | 140.00 E - 179.99 E |
| 25 | 40.00 N - 49.99 N | 180.00 W - 105.00 W |
| 26 | 40.00 N - 49.99 N | 104.99 W - 85.00 W |
| 27 | 40.00 N - 49.99 N | 84.99 W - 71.00 W |
| 28 | 40.00 N - 49.99 N | 70.99 W - 1.00 W |
| 29 | 40.00 N - 49.99 N | 0.99 W - 7.99 E |
| 30 | 40.00 N - 49.99 N | 8.00 E - 12.99 E |
| 31 | 40.00 N - 49.99 N | 13.00 E - 19.99 E |
| 32 | 40.00 N - 49.99 N | 20.00 E - 26.99 E |
| 33 | 40.00 N - 49.99 N | 27.00 E - 34.99 E |
| 34 | 40.00 N - 49.99 N | 35.00 E - 41.99 E |
| 35 | 40.00 N - 49.99 N | 42.00 E - 45.99 E |
| 36 | 40.00 N - 49.99 N | 46.00 E - 59.99 E |
| 37 | 40.00 N - 49.99 N | 60.00 E - 74.99 E |
| 38 | 40.00 N - 49.99 N | 75.00 E - 93.99 E |
| 39 | 40.00 N - 49.99 N | 94.00 E - 125.99 E |
| 40 | 40.00 N - 49.99 N | 126.00 E - 138.99 E |

# APPENDIX A

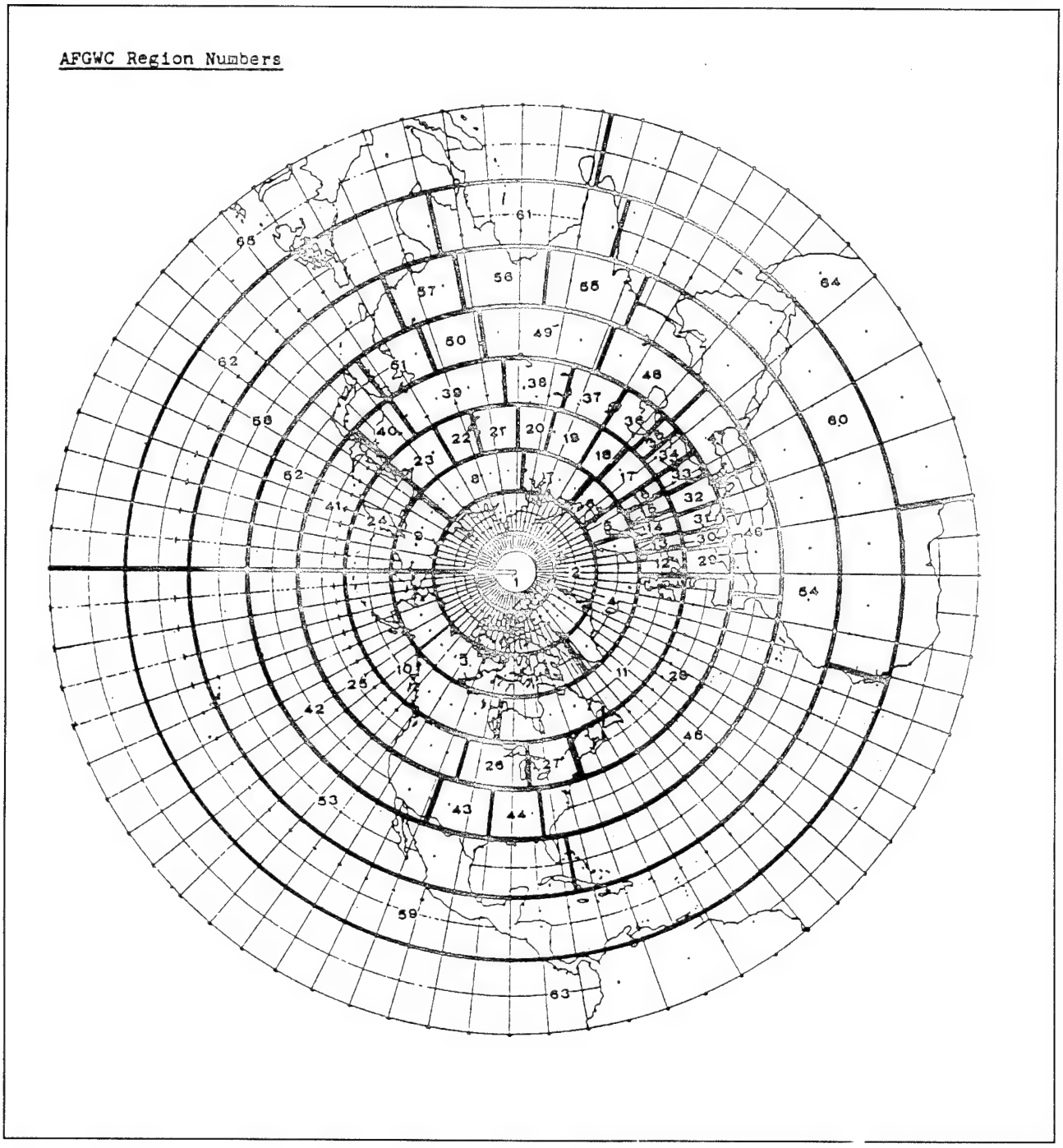
## AFGWC REGIONS DATA BASE (cont.)

| AFGWC REGION | LATITUDES | LONGITUDES |
|---|---|---|
| 41 | 40.00 N - 49.99 N | 139.00 E - 179.99 E |
| 42 | 30.00 N - 39.99 N | 180.00 W - 109.00 W |
| 43 | 30.00 N - 39.99 N | 108.99 W - 95.00 W |
| 44 | 30.00 N - 39.99 N | 94.99 W - 83.00 W |
| 45 | 30.00 N - 39.99 N | 82.99 W - 5.00 W |
| 46 | 30.00 N - 39.99 N | 4.99 W - 24.99 E |
| 47 | 30.00 N - 39.99 N | 25.00 E - 44.99 E |
| 48 | 30.00 N - 39.99 N | 45.00 E - 68.99 E |
| 49 | 30.00 N - 39.99 N | 69.00 E - 98.99 E |
| 50 | 30.00 N - 39.99 N | 99.00 E - 111.99 E |
| 51 | 30.00 N - 39.99 N | 112.00 E - 126.99 E |
| 52 | 30.00 N - 39.99 N | 127.00 E - 179.99 E |
| 53 | 20.00 N - 29.99 N | 180.00 W - 78.00 W |
| 54 | 20.00 N - 29.99 N | 77.99 W - 66.99 E |
| 55 | 20.00 N - 29.99 N | 67.00 E - 84.99 E |
| 56 | 20.00 N - 29.99 N | 85.00 E - 101.99 E |
| 57 | 20.00 N - 29.99 N | 102.00 E - 114.99 E |
| 58 | 20.00 N - 29.99 N | 115.00 E - 179.99 E |
| 59 | 10.00 N - 19.99 N | 180.00 W - 16.00 W |
| 60 | 10.00 N - 19.99 N | 15.99 E - 73.99 E |
| 61 | 10.00 N - 19.99 N | 74.00 E - 103.99 E |
| 62 | 10.00 N - 19.99 N | 104.00 E - 179.99 E |
| 63 | 0.00 - 9.99 N | 180.00 W - 9.99 E |
| 64 | 0.00 - 9.99 N | 10.00 E - 78.99 E |
| 65 | 0.00 - 9.99.N | 79.00 E - 179.99 E |
| 66 | 0.01 S - 10.00 S | 180.00 W - 33.99 E |
| 67 | 0.01 S - 10.00 S | 34.00 E - 179.99 E |
| 68 | 10.01 S - 20.00 S | 180.00 W - 23.99 E |
| 69 | 10.01 S - 20.00 S | 24.00 E - 179.99 E |
| 70 | 20.01 S - 30.00 S | 180.00 W - 47.00 W |
| 71 | 20.01 S - 30.00 S | 46.99 W - 113.99 E |
| 72 | 20.01 S - 30.00 S | 114.00 E - 179.99 E |
| 73 | 30.01 S - 40.00 S | 180.00 W - 56.00 W |
| 74 | 30.01 S - 40.00 S | 55.99 W - 179.99 E |
| 75 | 40.01 S - 50.00 S | 180.00 W - 179.99 E |
| 76 | 50.01 S - 90.00 S | 180.00 W - 179.99 E |
| 77 | LATE, LOCATABLE REPORTING SITES | |
| 78 | NO-ID'S, NON-LOCATABLE REPORTING SITES | |
| 79 | REJECTS | |
| 80 | OVERFLOWS, DATA NOT STORED FROM FULL REGIONS | |
| 99 | MISSING | |

## APPENDIX A

## AFGWC REGIONS

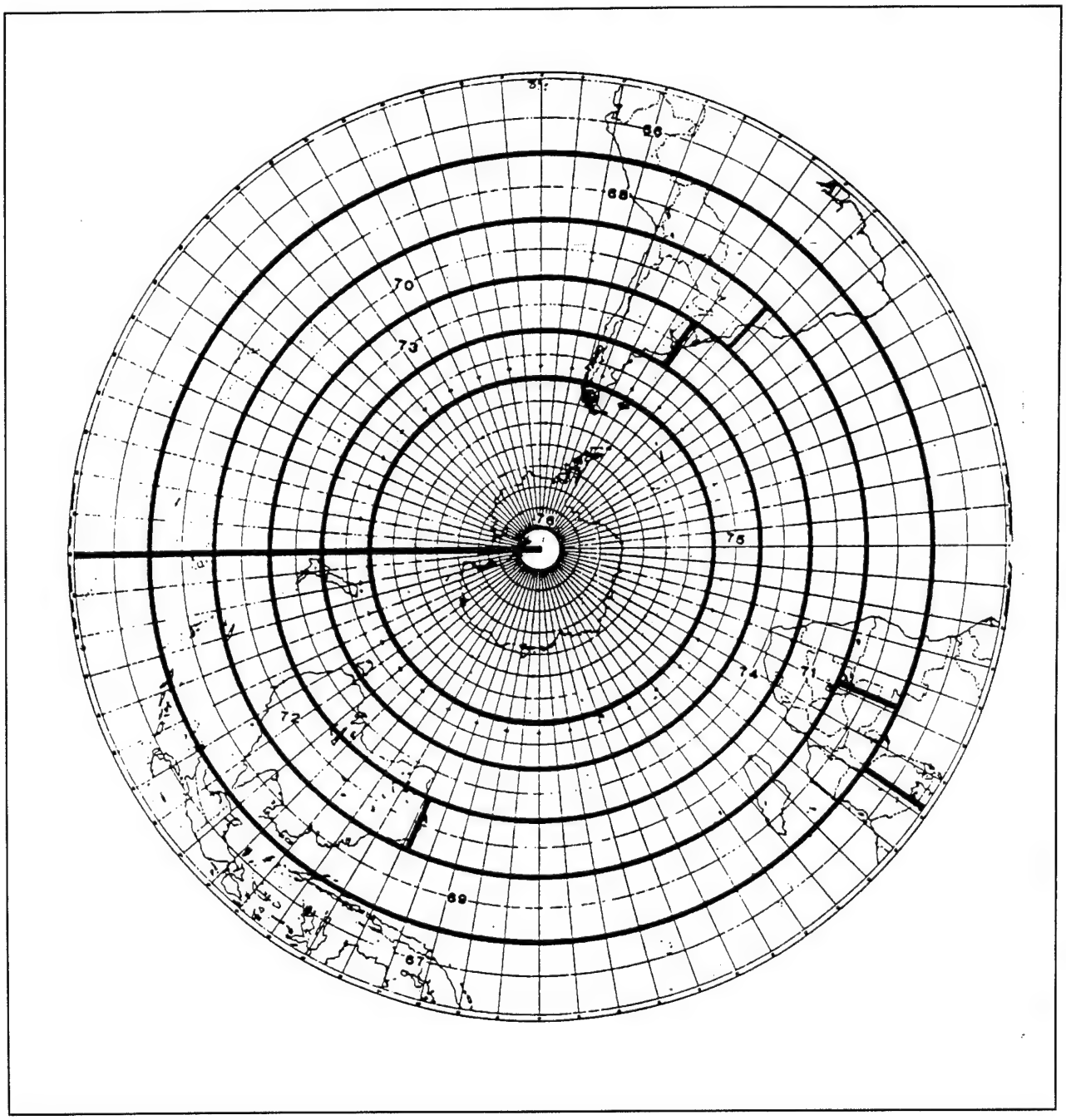
### Northern Hemisphere



## APPENDIX A

## AFGWC REGIONS (cont.)

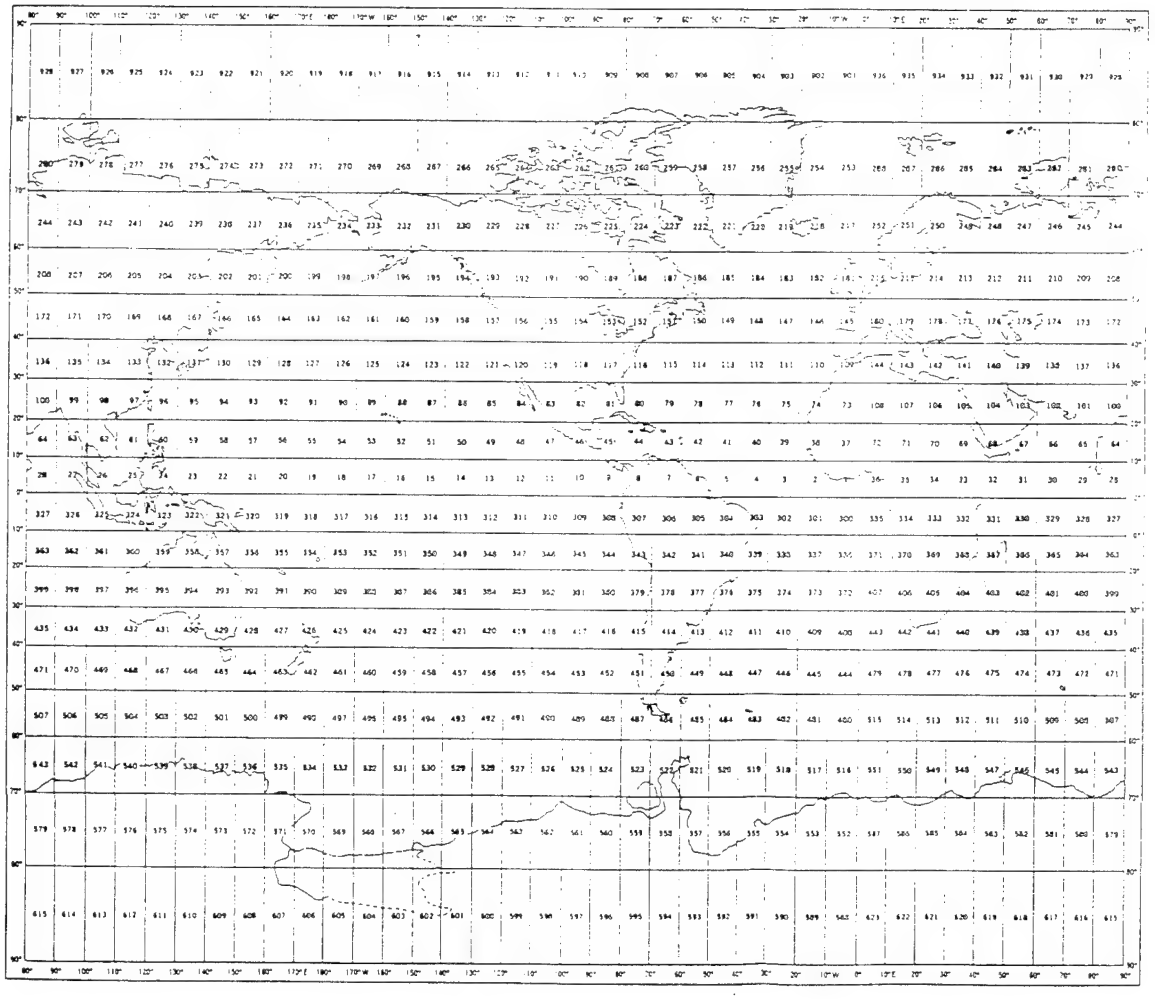
### Southern Hemisphere



# APPENDIX B

## MARSDEN SQUARES - WMO CODE TABLE 2590

Symbol MMM = Number of Marsden Square for the Ship's Position at the Time of Observation



## APPENDIX B

## MARSDEN SQUARES - WMO CODE TABLE 2590 (cont.)

**MMM** CODE TABLES

***(Code table 2590—continued)***

**Note: The number to be coded for $U_{La}U_{Lo}$ in the position verifying group $MMMU_{La}U_{Lo}$ is obtained by combining the second figure for $L_a$ and the third figure for $L_o$ in the reported position ($L_aL_aL_a$ $Q_cL_oL_oL_oL_o$). This number $U_{La}U_{Lo}$ is the number of the one-degree subdivision of the Marsden ten-degree square in which the ship is located at the time of observation.**

**When the ship is on the boundary between two (or four) ten-degree Marsden squares, the number to be coded for MMM is that of the Marsden ten-degree square in which the one-degree subdivision whose number is $U_{La}U_{Lo}$, as defined above, corresponds to the ship's position.**

**When the ship is on the meridian 0° or 180°, as well as on the Equator, the number used for reporting $Q_c$ shall be taken into account for determining the relevant number of the Marsden ten-degree square.**

Examples:

(1) For a ship located at 42.3 °N and 30.0 °W, the position is coded as follows:

$Q_c = 7$, $L_aL_aL_a = 423$, $L_oL_oL_oL_o = 0300$

$U_{La}U_{Lo}$ is therefore **20**. The ship is on the boundary line between Marsden squares 147 and 148. The relevant scheme of the annex ($Q_c = 7$) shows that the one-degree subdivision corresponding to the ship's position would be numbered 29 in Marsden square 147 and **20** in Marsden square 148. MMM is therefore to be coded 148.

(2) For a ship located at 40.0 °S and 120.0 °E, the position is coded as follows:

$Q_c = 3$, $L_aL_aL_a = 400$, $L_oL_oL_oL_o = 1200$

$U_{La}U_{Lo}$ is therefore **00**. The ship is on the boundary point between Marsden squares 431, 432, 467 and 468. The relevant scheme of the annex ($Q_c = 3$) shows that the one-degree subdivision corresponding to the ship's position would be 90 in Marsden square 431, 99 in Marsden square 432, **00** in Marsden square 467, and 09 in Marsden square 468. MMM is therefore to be coded 467.

(See annex on the next page)

## APPENDIX B

## MARSDEN SQUARES - WMO CODE TABLE 2590 (ANNEX)

CODE TABLES **MMM**

*(Code table 2590—continued)*

ANNEX

**Subdivisions of the Marsden ten-degree squares into one-degree squares for the eight octants (Q) of the globe**

WEST EAST

| 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 |
|---|---|---|---|---|---|---|---|---|---|
| 89 | | | | | | | | | 80 |
| 79 | | | | | | | | | 70 |
| 69 | | | | | | | | | 60 |
| 59 | | | | | | | | | 50 |
| 49 | | | | | | | | | 40 |
| 39 | | | | | | | | | 30 |
| 29 | | | | | | | | | 20 |
| 19 | | | | | | | | | 10 |
| 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |

$Q_c = 7$

| 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 |
|---|---|---|---|---|---|---|---|---|---|
| 80 | | | | | | | | | 89 |
| 70 | | | | | | | | | 79 |
| 60 | | | | | | | | | 69 |
| 50 | | | | | | | | | 59 |
| 40 | | | | | | | | | 49 |
| 30 | | | | | | | | | 39 |
| 20 | | | | | | | | | 29 |
| 10 | | | | | | | | | 19 |
| 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 |

$Q_c = 1$

NORTH

| 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
|---|---|---|---|---|---|---|---|---|---|
| 19 | | | | | | | | | 10 |
| 29 | | | | | | | | | 20 |
| 39 | | | | | | | | | 30 |
| 49 | | | | | | | | | 40 |
| 59 | | | | | | | | | 50 |
| 69 | | | | | | | | | 60 |
| 79 | | | | | | | | | 70 |
| 89 | | | | | | | | | 80 |
| 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 |

$Q_c = 5$

| 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 |
|---|---|---|---|---|---|---|---|---|---|
| 10 | | | | | | | | | 19 |
| 20 | | | | | | | | | 29 |
| 30 | | | | | | | | | 39 |
| 40 | | | | | | | | | 49 |
| 50 | | | | | | | | | 59 |
| 60 | | | | | | | | | 69 |
| 70 | | | | | | | | | 79 |
| 80 | | | | | | | | | 89 |
| 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 |

$Q_c = 3$

SOUTH

## APPENDIX C

### RAOB INSTRUMENT TYPE, FIELD C-24

| AFGWC TYPE | AWSMSC TYPE | MANUFACTURER | INSTRUMENT TYPE |
|---|---|---|---|
| 01 | N2 | VIZ | 1206 (403MHZ) |
| 01 | N6 | VIZ | OMEGA (403MHZ) |
| 01 | N7 | VIZ | J008 Solid State(1680) |
| 01 | N8 | VIZ | 1397 (72MHZ) |
| 01 | N9 | VIZ | MICROSONDE (403MHZ) |
| 01 | N0 | VIZ | ? |
| 01 | NA | VIZ | 1475 (403MHZ) |
| 01 | NB | VIZ | 1395 (403MHZ) |
| 01 | NC | VIZ | 1394 (403MHZ) |
| 02 | I1 | PHILLIPS | ASTOR RS-4 (403MHZ) |
| 02 | N3 | VIZ | 1495 (403MHZ) |
| 03 | N4 | VIZ | AMT-4B (1680MHZ) |
| 05 | K1 | SANGAMO | (1680MHZ) |
| 08 | J3 | METEORITE | A-22IV (216MHZ) |
| 08 | JA | METEORITE | A-22IV (400MHZ) |
| 10 | C1 | GRAW/SPRENGER | M60 (403MHZ) |
| 10 | C2 | GRAW | H60 (153MHZ) |
| 10 | CA | GRAW/SPRENGER | M60 (28MHZ) |
| 10 | N1 | VIZ | 1392 (1680MHZ) |
| 11 | H1 | MESURAL | FMO 1950A (403MHZ) |
| 11 | H2 | MESURAL | FMO 1945A (403MHZ) |
| 11 | H3 | MESURAL | MH 73A (403MHZ) |
| 12 | L1 | VAISALA | RS-18 (25MHZ) |
| 12 | L2 | VAISALA | RS21-12C (403MHZ) |
| 12 | L3 | VAISALA | RS21-13C (1680MHZ) |
| 12 | L4 | VAISALA | WS-18 (25MHZ) |
| 12 | L5 | VAISALA | RS-80 (403MHZ) |
| 13 | G1 | MEISEI or OKI | RS-2-80 (1680MHZ) |
| 16 | J1 | METEORITE | RKZ-2 (1782MHZ) |
| 16 | J2 | METEORITE | RKZ-5 (1782MHZ) |
| 17 | N5 | VIZ | LORAN-C (403MHZ) |
| 17 | O1 | UK MET. OFFICE | U.K. RS (28MHZ) |
| 25 | 00 | UNKNOWN | UNKNOWN |
| 25 | B1 | ELIN | 2402 (403MHZ) |
| 25 | D1 | INDIA MET SERV. | A-SONDE MKIII (401 or 1680MHZ) |
| 25 | E1 | JINYANG(VIZ) | (1680MHZ) |
| 25 | F1 | METEOLABOR | BASORA (403MHZ) |
| 25 | M1 | VINOHRADY | ZAP MARS ;WF BERLIN (1680MHZ) |
| 99 | MISSING | | |

# APPENDIX C

## WMO CODE TABLES

### CODE 0262

**$a_1$ Reason for no report or ground equipment employed**

00 - Launch not scheduled
01 - Rocket motor failure
02 - Instrument (or) telemetry signal not received
03 - Ground tracking equipment failure
04 - Weather prohibited launch
05 - Range restrictions prohibited launch
06 - Lack of expendables prohibited launch
07 - Radar not employed
08 - Radar and telemetry equipment employed
09 - Telemetry equipment only employed

### CODE 0265

**$a_4$ - Type of measuring equipment used**

0 - Pressure instrument associated with wind-measuring equipment
1 - Optical theodolite
2 - Radio theodolite
3 - Radar
4 - Pressure instrument associated with wind-measuring equipment but pressure element failed during ascent
5 - VLF-Omega
6 - LORAN-C
7 - Wind Profiler
8 - Satellite Navigation
9 - Missing

### CODE 0509

**$C_H$ - Clouds of the genera Cirrus, Cirrocumulus and Cirrostratus**

00 - No Cirrus, Cirrocumulus or Cirrostratus
01 - Cirrus in th form of filaments, strands or hooks, not progressively invading the sky
02 - Dense Cirrus, in patches or entangled sheaves, which usually do not increase and sometimes seem to be the remains of the upper part of a Cumulonimbus; or Cirrus with sproutings in the form of small turrets or battlements, or Cirrus having the appearance of cumuliform tufts
03 - Dense Cirrus, often in the form of an anvil, being the remains of the upper parts of Cumulonimbus
04 - Cirrus in the form of hooks or of filaments, or both, progressively invading the sky; they generally become denser as a whole
05 - Cirrus (often in bands converging towards one point or two opposite points of the horizon) and Cirrostratus, or Cirrostratus alone; in either case, they are progressively invading the sky, and generally growing denser as a whole, but the continuous veil does not reach 45° above the horizon
06 - Cirrus (often in bands converging towards one point or two opposite points of the horizon) and Cirrostratus, or Cirrostratus alone; in either case, they are progressively invading the sky, and generally growing denser as a whole, the continuous veil extends more than 45° above the horizon, without the sky being totally covered

CODE 0509 (CONTINUED)

07 - Veil of Cirrostratus covering the celestial dome.
08 - Cirrostratus not progressively invading the sky and not completely covering the celestial dome.
09 - Cirrocumulus alone, or Cirrocumulus accompanied by Cirrus or Cirrostratus, or both, but Cirrocumulus is predominate.
10 - Cirrus, Cirrocumulus, and Cirrostratus invisible owing to darkness, fog, blowing dust and sand, or other similar phenomena, or more often because of the presence of a continuous layer of lower clouds.

CODE 0513

**$C_L$ - Clouds of the genera Stratocumulus, Stratus, Cumulus and Cumulonimbus**

00 - No Stratocumulus, Stratus, Cumulus or Cumulonimbus
01 - Cumulus with little vertical extent and seemingly flattened, or ragged Cumulus other than of bad weather*, or both
02 - Cumulus of moderate or strong vertical extent, generally with protuberances in the form of domes or towers, either accompanied or not by other Cumulus or by Stratocumulus, all having their bases at the same level
03 - Cumulonimbus the summits of which, at least partially, lack sharp outlines, but are neither clearly fibrous (cirriform) nor in the form of an anvil; Cumulus, Stratocumulus or Stratus may also be present
04 - Stratocumulus formed by the spreading out of Cumulus; Cumulus may also be present
05 - Stratocumulus not resulting from the spreading out of Cumulus
06 - Stratus in a more or less continuous sheet or layer, or in ragged shreds, or both, but no Stratus fractus of bad weather*
07 - Stratus fractus of bad weather* or Cumulus fractus of bad weather*, or both(pannus), usually below Altostratus or Nimbostratus
08 - Cumulus and Stratocumulus other than that formed from the spreading out of Cumulus; the base of the Cumulus is at a different level from that of the Stratocumulus
09 - Cumulonimbus, the upper part of which is clearly fibrous(cirriform), often
in the form of an anvil; either accompanied or not by Cumulonimbus without anvil or fibrous upper part, by Cumulus, Stratocumulus, Stratus or pannus
10 - Stratocumulus, stratus,cumulus and cumulonimbus invisible owing to darkness, fog, blowing dust or sand or other similar phenomena

* "Bad Weather" denotes the conditions which generally exist during precipitation and a short time before and after.

## APPENDIX C

## WMO CODE TABLES (cont.)

### CODE 0515

**$C_M$ - Clouds of the genera Altocumulus, Altostratus and Nimbostratus**

00 - No Altocumulus, Altostratus or Nimbostratus
01 - Altostratus, the greater part of which is semi-transparent; through this part the sun or moon may be weakly visible, as through ground glass
02 - Altostratus, the greater part of which is sufficiently dense to hide the sun or moon, or Nimbostratus
03 - Altocumulus, the greater part of which is semi-transparent; the various elements of the cloud change only slowly and are all at a single level
04 - Patches (often in the form of almonds or fishes) of Altocumulus, the greater part of which is semi-transparent; the clouds occur at one or more levels and the elements are continually changing in appearance
05 - Semi-transparent Altocumulus in bands, or Altocumulus, in one or more fairly continuous layer (semi-transparent or opaque), progressively invading the sky; these Altocumulus clouds generally thicken as a whole
06 - Altocumulus resulting from the spreading out of Cumulus (or Cumulonimbus)
07 - Altocumulus in two or more layers, usually opaque in places, and not progressively invading the sky; or opaque layer of Altocumulus, not progressively invading the sky; or Altocumulus together with Altostratus or Nimbostratus.
08 - Altocumulus with sproutings in the form of small towers or battlements, of Altocumulus having the appearance of cumuloform tufts
09 - Altocumulus of a chaotic sky, generally at several levels
10 - Altocumulus, Altostratus, and Nimbostratus invisible owing to darkness, fog, blowing dust and sand, or other similar phenomena, or more often because of the presence of a continuous layer of lower clouds

### CODE 0659

**$c_T$ - Thermodynamic correction technique**
**$c_W$ - Wind correction technique**

0 - No correction applied
1 - US standard correction
2 - UK standard correction
3 - Japan standard correction
4-9 Unassigned

### CODE 1085

**$e_Te_T$ - Type of thermodynamic sensing equipment**

00 - No thermodynamic sensor
01-49 - Sonde
50-54 - Sphere
55-59 - Grenade
60-64 - Density gauge
65-69 - Pressure gauge
70-79 - Remote sensing
80-99 - Unassigned

NOTE: When specifications indicating experimental equipment are reported, plain language remarks explaining the experimental nature of the equipment shall be added at the end of the coded report.

## APPENDIX C

## WMO CODE TABLES (cont.)

### CODE 1095

**$e_We_W$ - Type of wind sensing equipment**

00 - No wind sensor
01-09 - Chaff
10-29 - Parachute
30-49 - Starute
50-54 - Sphere
55-59 - Grenade
60-64 - Chemical trail
65-69 - Meteor trail
70-79 - Remote sensing
80-99 - Unassigned

NOTE: When specifications indicating experimental equipment are reported, plain language remarks explaining the experimental nature of the equipment shall be added at the end of the coded report.

### CODE 1600

**h - Height above surface of the base of the lowest cloud seen**

00 - 0 to 50 meters
01 - 50 to 100m
02 - 100 to 200m
03 - 200 to 300m
04 - 300 to 600m
05 - 600 to 1000m
06 - 1000 to 1500m
07 - 1500 to 2000m
08 - 2000 to 2500m
09 - 2500m or more, or no clouds
10 - Height of base of cloud not known or base of clouds at a level lower and tops at a level higher than that of the station

### CODE 2649

**$m_r$ - Method of reducing data**

01 - Manually - Nomogram
02 - Electronic computer
09 - Other method

NOTE: Code figure 01 shall be reported if all, or any portion, of the data reduction was manual. Code figure 02 shall be reported only when all the data reduction was by electronic computer.

## APPENDIX C

### WMO TABLES (cont.)

#### CODE 2700

**N - Total cloud cover**
**Nh - Amount of the Cl or Cm cloud cover**
**Ns - Amount of individual cloud layer or mass whose genus is indicated by C**
**N' - Amount of cloud whose base is below the level of the station**

| | |
|---|---|
| 00 - zero | zero |
| 01 - 1 okta or less, but not zero | 1/10 or less, but not zero |
| 02 - 2 oktas | 2/10 - 3/10 |
| 03 - 3 oktas | 4/10 |
| 04 - 4 oktas | 5/10 |
| 05 - 5 oktas | 6/10 |
| 06 - 6 oktas | 7/10 - 8/10 |
| 07 - 7 oktas or more, but not 8 oktas | 9/10 or more, but not 10/10 |
| 08 - 8 oktas | 10/10 |

09 - Sky obscured, or cloud amount cannot be estimated
10 - Cloud cover is indiscernible for reason other than fog or other Meteorological phenomena, or observation not made.

#### CODE 3644

**$r_M$ - Type of rocket motor**

0 - 114 mm(4.5 in) end burning
1 - 76 mm(3.0 in) internal burning
2 - Boosted, 114 mm(4.5 in) end burning
3 - Boosted, 76 mm(3.0 in) internal burning
4 - 135 mm(5.3 in) internal burning
5 - 160 mm(6.3 in) internal burning
6-9 Not used

# APPENDIX C

## WMO CODE 4677

### ww - Present Weather

CODE TABLES ww

**4677**

**ww—*Present weather reported from a manned weather station***

| | |
|---|---|
| ww = 00–49 | *No precipitation at the station at the time of observation* |
| ww = 00–19 | No precipitation, fog, ice fog (except for 11 and 12), duststorm, sandstorm, drifting or blowing snow at the station* at the time of observation or, except for 09 and 17, during the preceding hour |

| Code figure ww | | |
|---|---|---|
| No meteors except photometeors | 00 Cloud development not observed or not observable | Characteristic change of the state of sky during the past hour |
| | 01 Clouds generally dissolving or becoming less developed | |
| | 02 State of sky on the whole unchanged | |
| | 03 Clouds generally forming or developing | |
| Haze, dust, sand or smoke | 04 Visibility reduced by smoke, e.g. veldt or forest fires, industrial smoke or volcanic ashes | |
| | 05 Haze | |
| | 06 Widespread dust in suspension in the air, not raised by wind at or near the station at the time of observation | |
| | 07 Dust or sand raised by wind at or near the station at the time of observation, but no well-developed dust whirl(s) or sand whirl(s), and no duststorm or sandstorm seen; or, in the case of ships, blowing spray at the station | |
| | 08 Well-developed dust whirl(s) or sand whirl(s) seen at or near the station during the preceding hour or at the time of observation, but no duststorm or sandstorm | |
| | 09 Duststorm or sandstorm within sight at the time of observation, or at the station during the preceding hour | |
| | 10 Mist | |
| | 11 Patches; 12 More or less continuous — shallow fog or ice fog at the station, whether on land or sea, not deeper than about 2 metres on land or 10 metres at sea | |
| | 13 Lightning visible, no thunder heard | |

(*continued*)

* The expression "at the station" refers to a land station or a ship.

# APPENDIX C

## CODE 4677 (cont.)

## ww - Present Weather

ww CODE TABLES

*(Code table 4677—continued)*

Code figure

14 Precipitation within sight, not reaching the ground or the surface of the sea

15 Precipitation within sight, reaching the ground or the surface of the sea, but distant, i.e. estimated to be more than 5 km from the station

16 Precipitation within sight, reaching the ground or the surface of the sea, near to, but not at the station

17 Thunderstorm, but no precipitation at the time of observation

18 Squalls
19 Funnel cloud(s)* } at or within sight of the station during the preceding hour or at the time of observation

---

ww = 20–29 Precipitation, fog, ice fog or thunderstorm at the station during the preceding hour but not at the time of observation

---

ww

20 Drizzle (not freezing) or snow grains
21 Rain (not freezing)
22 Snow
23 Rain and snow or ice pellets
24 Freezing drizzle or freezing rain
} not falling as shower(s)

25 Shower(s) of rain
26 Shower(s) of snow, or of rain and snow
27 Shower(s) of hail**, or of rain and hail**
28 Fog or ice fog
29 Thunderstorm (with or without precipitation)

---

ww = 30–39 Duststorm, sandstorm, drifting or blowing snow

---

ww

30
31
32
} Slight or moderate duststorm or sandstorm

- has decreased during the preceding hour
- no appreciable change during the preceding hour
- has begun or has increased during the preceding hour

---

* Tornado cloud or waterspout.

** Hail, small hail, snow pellets. French: grêle, grésil ou neige roulée.

# APPENDIX C

## WMO CODE 4677 (cont.)

### ww - Present Weather

CODE TABLES **ww**

*(Code table 4677—continued)*

| Code figure | | |
|---|---|---|
| 33 | Severe duststorm or sandstorm | – has decreased during the preceding hour |
| 34 | | – no appreciable change during the preceding hour |
| 35 | | – has begun or has increased during the preceding hour |
| 36 | Slight or moderate drifting snow | generally low (below eye level) |
| 37 | Heavy drifting snow | |
| 38 | Slight or moderate blowing snow | generally high (above eye level) |
| 39 | Heavy blowing snow | |

**ww = 40–49 Fog or ice fog at the time of observation**

| ww | | |
|---|---|---|
| 40 | Fog or ice fog at a distance at the time of observation, but not at the station during the preceding hour, the fog or ice fog extending to a level above that of the observer | |
| 41 | Fog or ice fog in patches | |
| 42 | Fog or ice fog, sky visible | has become thinner during the preceding hour |
| 43 | Fog or ice fog, sky invisible | |
| 44 | Fog of ice fog, sky visible | no appreciable change during the preceding hour |
| 45 | Fog or ice fog, sky invisible | |
| 46 | Fog or ice fog, sky visible | has begun or has become thicker during the preceding hour |
| 47 | Fog or ice fog, sky invisible | |
| 48 | Fog, depositing rime, sky visible | |
| 49 | Fog, depositing rime, sky invisible | |

**ww = 50–99 *Precipitation at the station at the time of observation***

**ww = 50–59 Drizzle**

| ww | | |
|---|---|---|
| 50 | Drizzle, not freezing, intermittent | slight at time of observation |
| 51 | Drizzle, not freezing, continuous | |
| 52 | Drizzle, not freezing, intermittent | moderate at time of observation |
| 53 | Drizzle, not freezing, continuous | |
| 54 | Drizzle, not freezing, intermittent | heavy (dense) at time of observation |
| 55 | Drizzle, not freezing, continuous | |
| 56 | Drizzle, freezing, slight | |

*(continued)*

## APPENDIX C

### WMO CODE 4677 (cont.)

### ww - Present Weather

ww CODE TABLES

*(Code table 4677—continued)*

Code figure

57 Drizzle, freezing, moderate or heavy (dense)
58 Drizzle and rain, slight
59 Drizzle and rain, moderate or heavy

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**ww = 60–69 Rain**

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| ww | | |
|---|---|---|
| 60 | Rain, not freezing, intermittent | slight at time of observation |
| 61 | Rain, not freezing, continuous | |
| 62 | Rain, not freezing, intermittent | moderate at time of observation |
| 63 | Rain, not freezing, continuous | |
| 64 | Rain, not freezing, intermittent | heavy at time of observation |
| 65 | Rain, not freezing, continuous | |
| 66 | Rain, freezing, slight | |
| 67 | Rain, freezing, moderate or heavy | |
| 68 | Rain or drizzle and snow, slight | |
| 69 | Rain or drizzle and snow, moderate or heavy | |

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**ww = 70–79 Solid precipitation not in showers**

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| ww | | |
|---|---|---|
| 70 | Intermittent fall of snowflakes | slight at time of observation |
| 71 | Continuous fall of snowflakes | |
| 72 | Intermittent fall of snowflakes | moderate at time of observation |
| 73 | Continuous fall of snowflakes | |
| 74 | Intermittent fall of snowflakes | heavy at time of observation |
| 75 | Continuous fall of snowflakes | |
| 76 | Diamond dust (with or without fog) | |
| 77 | Snow grains (with or without fog) | |
| 78 | Isolated star-like snow crystals (with or without fog) | |
| 79 | Ice pellets | |

## APPENDIX C

## WMO CODE 4677 (Continued)

### ww - Present Weather



*(Code table 4677 — continued)*

**ww = 80–99 Showery precipitation, or precipitation with current or recent thunderstorm**

| Code figure ww | | |
|---|---|---|
| 80 | Rain shower(s), slight | |
| 81 | Rain shower(s), moderate or heavy | |
| 82 | Rain shower(s), violent | |
| 83 | Shower(s) of rain and snow mixed, slight | |
| 84 | Shower(s) of rain and snow mixed, moderate or heavy | |
| 85 | Snow shower(s), slight | |
| 86 | Snow shower(s), moderate or heavy | |
| 87 | Shower(s) of snow pellets or small hail, with or without rain or rain and snow mixed | – slight |
| 88 | | – moderate or heavy |
| 89 | Shower(s) of hail*, with or without rain or rain and snow mixed, not associated with thunder | – slight |
| 90 | | – moderate or heavy |
| 91 | Slight rain at time of observation | Thunderstorm during the preceding hour but not at time of observation |
| 92 | Moderate or heavy rain at time of observation | |
| 93 | Slight snow, or rain and snow mixed or hail** at time of observation | |
| 94 | Moderate or heavy snow, or rain and snow mixed or hail** at time of observation | |
| 95 | Thunderstorm, slight or moderate, without hail**, but with rain and/or snow at time of observation | Thunderstorm at time of observation |
| 96 | Thunderstorm, slight or moderate, with hail** at time of observation | |
| 97 | Thunderstorm, heavy, without hail**, but with rain and/or snow at time of observation | |
| 98 | Thunderstorm combined with dust-storm or sandstorm at time of observation | |
| 99 | Thunderstorm, heavy, with hail** at time of observation | |

* French: grêle.

** Hail, small hail, snow pellets. French: grêle, grésil ou neige roulée.

## APPENDIX D

## DATA TYPE INDICATORS

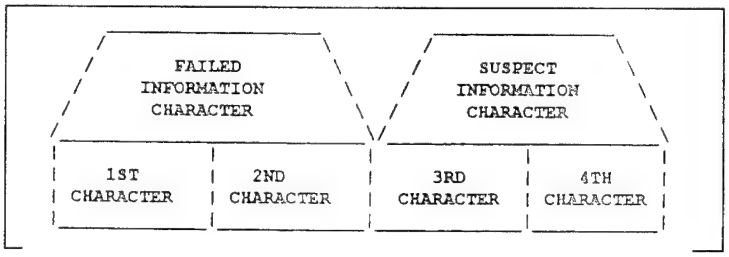
| DATSAV2 CODE | DATA TYPE | DATA GROUP | FORMAT TYPE |
|---|---|---|---|
| A | RAOB/PIBAL SURFACE | LEVEL DATA | LEVEL |
| B | RAOB/PIBAL/ROCOB | MANDATORY | LEVEL DATA LEVEL |
| C | RAOB/PIBAL/ROCOB | SIGNIFICANT LEVEL DATA | LEVEL |
| D | RAOB | ROTPOPAUSE DATA | ADDITIONAL |
| E | RAOB/PIBAL | MAXIUMUM WIND DATA | ADDITIONAL |
| F | RAOB | CLOUD DATA | ADDITIONAL |
| H | RAOB/PIBAL | MEAN WIND DATA, SFC-5000 FEET | ADDITIONAL |
| K | RAOB | STABILITY INDEX DATA | ADDITIONAL |
| M | RAOB | FREEZING LEVEL DATA | ADDITIONAL |
| P | RAOB | THERMAL WINDS DATA | ADDITIONAL |
| T | RAOB | PRECIP WATER/PRESENT WEATHER | ADDITIONAL |
| U | RAOB/PIBAL/ROCOB | OTHER CARDS LEVEL TYPES | LEVEL |
| W | RAOB | REMARKS DATA | REMARKS |
| X | PIBAL | REMARKS DATA | REMARKS |
| Y | ROCOB | REMARKS DATA | REMARKS |
| Z | RAOB/PIBAL/ROCOB | REJECTS DATA | REJECTS |

## APPENDIX E

### VALIDATION FLAGS ( in LEVEL DATA sections)

Each meteorological element (pressure, height, temperature, wind direction, wind velocity, and density) will be flagged when it either fails during validation or is identified as being suspect. Values which fail will either be recomputed or set to missing in most cases (values will not normally be rejected if they fail only the First Guess Field Check).

Each flag word will contain four characters; "0000." The first two will identify checks that the element failed and the remaining two character bytes will identify checks that were suspect during the validation checks. Character 1 is the left-most character.




**CHARACTER 1 (FAIL): Validation code's 1st Character**

| VALUE | MEANING |
|---|---|
| 0 | No Internal Consistency or Meteorological Failures |
| 1 | NOT USED |
| 2 | Failed Internal Consistency Check Only. |
| 3 | NOT USED |
| 4 | Failed Meteorological Check Only. |
| 5 | NOT USED |
| 6 | Failed Internal Consistency and Meteorological Checks. |
| 7 | NOT USED |
| 8 | ELEMENT RECOMPUTED (in data prior to JAN 1989 and from TDF63 data) |
| 9 | MISSING |

**CHARACTER 2 (FAIL): Validation code's 2nd Character**

| VALUE | MEANING |
|---|---|
| 0 | No 101 Group, Gross Error or First-Guess Failures. |
| 1 | Failed 101 Check Only. |
| 2 | Failed Gross Error Check Only. |
| 3 | Failed 101 Group and Gross Error Checks. |
| 4 | Failed First-Guess Checks Only. |
| 5 | Failed 101 Group and First-Guess Checks. |
| 6 | Failed Gross Error and First-Guess Checks. |
| 7 | Failed 101 Group, Gross Error and First-Guess Checks. |
| 8 | NOT USED |
| 9 | MISSING |

NOTE: (1) Only Values 0, 2 and 9 are used with density.
(2) Values 0, 2 , 8 and 9 are used with pressure.

## APPENDIX E

### CHARACTER 3 (SUSPECT): Validation code's 3rd Character

| VALUE | MEANING |
|---|---|
| 0 | No Internal Consistency or Meteorological Suspects. |
| 1 | Pressure received Out of Sequence. |
| 2 | Suspect by Internal Consistency Check Only. |
| 3 | Pressure received Out of Sequence and Suspect by Internal Consistency Check. |
| 4 | Suspect by Meteorological Check Only. |
| 5 | Pressure received Out of Sequence and Suspect by Meteorological Checks. |
| 6 | Suspect by Internal Consistency and Meteorological Checks. |
| 7 | Pressure received Out of Sequence and Suspect by Internal Consistency and Meteorological Checks. |
| 8 | NOT USED |
| 9 | MISSING |

### CHARACTER 4 (SUSPECT): Validation code's 4th Character

| VALUE | MEANING |
|---|---|
| 0 | No 101 Group, Gross Error or First-Guess Suspects. |
| 1 | Suspect by 101 Group Checks Only. |
| 2 | Suspect by Gross Error Check Only. |
| 3 | Suspect by 101 Group and Gross Error Checks. |
| 4 | Suspect by First-Guess Checks Only. |
| 5 | Suspect by 101 Group and First-Guess Checks. |
| 6 | Suspect by Gross Error and First-Guess Checks. |
| 7 | Suspect by 101 Group, Gross Error and First Guess Checks. |
| 8 | NOT USED |
| 9 | MISSING |

NOTE: Only Values 0, 2 and 9 are used for PRESSURE and DENSITY.

## APPENDIX F

### A. Rejected Data Section

The rejected section is usually for OL-A, AFCCC, use only. It contains the original values for those fields deemed to be in error by AFGWC or OL-A, AFCCC. Control field C05 indicates the number of characters in this section. Data sent out of OL-A that doesn't include reject data contains character "9s" in C05. Also, field C01 (total character count for entire observation) counts rejects section characters for in-house data, but not for data sent outside of OL-A.

**B. RAOB Report Rejected Data Section**

| FIELD NO. | R00 | R01 | R02 | R03 | R04 | R05 | R06 |
|---|---|---|---|---|---|---|---|
| DATA FIELD | IND | RES | = | PRESS LEVEL | REJ ELM IND | RES | VALUE |
| # CHARS | Z | XX | X | XXXXXX | X | X | SXXXXXXX |
| CHAR LOC | 1 | 2-3 | 4 | 5-10 | 11 | 12 | 13-20 |

**Fields R03 through R06 are repeated for each rejected data element.**

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| R00 | IND. Value = "Z" |
| R01 | RES. Reserved, ASCII blank-filled |
| R02 | = (Special Indicator) |
| R03 | PRESS LEVEL. Pressure level of rejected element stored in tenths of millibars (e.g. 771.3 stored as 007713). If R04 = P, then R03 is recomputed pressure. |
| R04 | REJ ELM IND. Rejected element indicator as follows:<br>P = Pressure<br>H = Height<br>T = Temperature<br>D = Dew Point<br>A = Wind Direction<br>F = Wind Speed<br>**Note:** RAOB Element rejected by pressure level. |
| R05 | RES. Reserved, coded as 9. |
| R06 | VALUE. Rejected element's value (-9999999 to +9999999). The value is stored in the same format as in the mandatory and additional data sections. |

**Note:** The rejected fields for the RAOB section contain original unchanged values for those fields deemed to be in error.

## APPENDIX F

### C. PIBAL Reports Rejected Data Section

| FIELD NO. | R00 | R01 | R02 | R03 | R04 | R05 | R06 |
|---|---|---|---|---|---|---|---|
| DATA FIELD | IND | RES | = | HGT LEVEL | REJ ELM IND | RES | VALUE |
| # CHARS | Z | XX | X | XXXXXX | X | X | SXXXXXXX |
| CHAR LOC | 1 | 2-3 | 4 | 5-10 | 11 | 12 | 13-20 |

**Fields R03 through R06 are repeated for each rejected data element.**

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| R00 | IND. Value = "Z" |
| R01 | RES. Reserved, ASCII blank-filled |
| R02 | = (Special Indicator) |
| R03 | HGT LEVEL. Height level of rejected element stored in whole meters. If R04 = H, then R03 is recomputed height. |
| R04 | REJ ELM IND. Rejected element indicator as follows:<br>H = Height<br>P = Pressure<br>A = Wind Direction<br>F = Wind Speed |
| R05 | RES. Reserved, coded as 9. |
| R06 | VALUE. Rejected element's value (-9999999 to +9999999). The value is stored in the same format as in the mandatory and additional data sections. |

**Note:** The rejected fields for the PIBAL section contain original unchanged values for those fields deemed to be in error.

**D. ROCOB Reports Rejected Data Section**

| FIELD NO. | R00 | R01 | R02 | R03 | R04 | R05 | R06 |
|---|---|---|---|---|---|---|---|
| DATA FIELD | IND | RES | = | HGT LEVEL | REJ ELM IND | RES | VALUE |
| # CHARS | Z | XX | X | XXXXXX | X | X | SXXXXXXX |
| CHAR LOC | 1 | 2-3 | 4 | 5-10 | 11 | 12 | 13-20 |

**Fields R03 through R06 are repeated for each rejected data element.**

| FIELD | DESCRIPTION OF FIELD AND COMMENTS |
|---|---|
| R00 | IND. Value = "Z" |
| R01 | RES. Reserved, ASCII blank-filled |
| R02 | = (Special Indicator) |
| R03 | HGT LEVEL. Height level of rejected element stored in whole meters. If R04 = H, then R03 is recomputed height. |
| R04 | REJ ELM IND. Rejected element indicator as follows:<br>H = Height<br>P = Pressure<br>T = Temperature<br>A = Wind Direction<br>F = Wind Speed<br>N = Density |
| R05 | RES. Reserved, coded as 9. |
| R06 | VALUE. Rejected element's value (-9999999 to +9999999). The value is stored in the same format as in the mandatory and additional data sections. |

**Note:** The rejected fields for the ROCOB section contain original unchanged values for those fields deemed to be in error.